Calhoun
Institutional Archive of the Naval Postgraduate School

Calhoun: The NPS Institutional Archive

DSpace Repository

Theses and Dissertations | 1. Thesis and Dissertation Collection, all items

1987

Beyond the black box: an assessment of strategic war gaming.

Mobley, Arthur Scott, Jr.; Tritten, James John.

http://hdl.handle.net/10945/22657

Downloaded from NPS Archive: Calhoun

DUDLEY KNOX LIBRARY

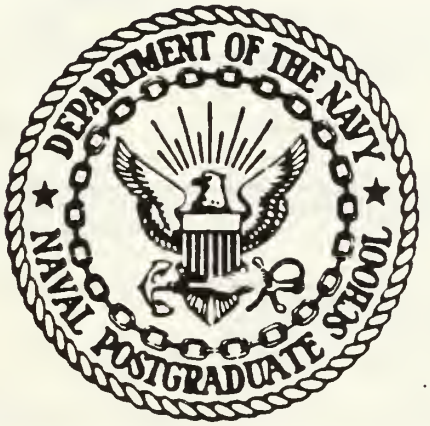
http://www.nps.edu/library

Calhoun is the Naval Postgraduate School's public access digital repository for research materials and institutional publications created by the NPS community. Calhoun is named for Professor of Mathematics Guy K. Calhoun, NPS's first appointed -- and published -- scholarly author.

Dudley Knox Library / Naval Postgraduate School
411 Dyer Road / 1 University Circle
Monterey, California USA 93943

SCHOOL

NAVAL POSTGRADUATE SCHOOL
Monterey, California



THESIS

M605575

BEYOND THE BLACK BOX:
AN ASSESSMENT OF STRATEGIC WAR GAMING

by

Arthur Scott Mobley, Jr.

December 1987

Thesis Advisor: James J. Tritten

Approved for public release; distribution is unlimited.

T239105

CURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED	1b. RESTRICTIVE MARKINGS
a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION / AVAILABILITY OF REPORT Approved for public release; distribution is unlimited.
b. DECLASSIFICATION / DOWNGRADING SCHEDULE	
PERFORMING ORGANIZATION REPORT NUMBER(S)	5. MONITORING ORGANIZATION REPORT NUMBER(S)
a. NAME OF PERFORMING ORGANIZATION Naval Postgraduate School	6b. OFFICE SYMBOL (*If applicable*) 38
7a. NAME OF MONITORING ORGANIZATION Naval Postgraduate School	
c. ADDRESS (*City, State, and ZIP Code*) Monterey, California 93943-5000	7b. ADDRESS (*City, State, and ZIP Code*) Monterey, California 93943-5000
a. NAME OF FUNDING / SPONSORING ORGANIZATION	8b. OFFICE SYMBOL (*If applicable*)
9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER	
c. ADDRESS (*City, State, and ZIP Code*)	10. SOURCE OF FUNDING NUMBERS

PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.	WORK UNIT ACCESSION NO.

1. TITLE (*Include Security Classification*)

BEYOND THE BLACK BOX: AN ASSESSMENT OF STRATEGIC WAR GAMING

2. PERSONAL AUTHOR(S)
Mobley, Arthur S., Jr.

3a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (*Year, Month, Day*)	15. PAGE COUNT
Master's Thesis	FROM _____ TO _____	1987 December	94

6. SUPPLEMENTARY NOTATION

7. COSATI CODES		
FIELD	GROUP	SUB-GROUP

18. SUBJECT TERMS (*Continue on reverse if necessary and identify by block number*)
War games, Strategy-Military, National Security, Operations Research, United States Military Policy.

9. ABSTRACT (*Continue on reverse if necessary and identify by block number*)

War games are currently enjoying a revival of interest and popularity within the American defense community. Strategists, analysts, and policy-makers alike are turning more and more to gaming as a medium for education, planning and discovery. This thesis investigates the nature, utility, and limitations of strategic-level war gaming as a tool for strategic planning and international negotiations. It offers a perspective on gaming different (yet complementary) to that of operations research: war games are viewed as sources of synthetic history, to be studied and interpreted by historical-type methods.

0. DISTRIBUTION / AVAILABILITY OF ABSTRACT	21. ABSTRACT SECURITY CLASSIFICATION
☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT ☐ DTIC USERS	unclassified
2a. NAME OF RESPONSIBLE INDIVIDUAL James J. Tritten	22b. TELEPHONE (*Include Area Code*) (408) 646-2521
	22c. OFFICE SYMBOL 56

D FORM 1473, 84 MAR 83 APR edition may be used until exhausted.
All other editions are obsolete

SECURITY CLASSIFICATION OF THIS PAGE
UNCLAS

☆ U.S. Government Printing Office: 1986—606-24

Approved for public release; distribution is unlimited.

Beyond the Black Box:
An Assessment of Strategic War Gaming

by

Arthur Scott Mobley, Jr.
Lieutenant, United States Navy
B.S., United States Naval Academy, 1978

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF ARTS IN NATIONAL SECURITY AFFAIRS

from the

NAVAL POSTGRADUATE SCHOOL
December, 1987

ABSTRACT

War games are currently enjoying a revival of interest and popularity within the American defense community. Strategists, analysts, and policy-makers alike are turning more and more to gaming as a medium for education, planning and discovery. This thesis investigates the nature, utility, and limitations of strategic-level war gaming as a tool for strategic planning and international negotiations. It offers a perspective on gaming different (yet complementary) to that of operations research: war games are viewed as sources of synthetic history, to be studied and interpreted by historical-type methods.

TABLE OF CONTENTS

I. INTRODUCTION ---------- 5

II. STRATEGIC GAMING AS A HISTORICAL METHODOLOGY ------- 9

A. THE HISTORICAL ORIGINS OF CONTEMPORARY STRATEGIC GAMING ---------- 9

B. GAMING CHARACTERIZED: A "REASONABLE" METHODOLOGY ---------- 14

C. GAMING METHODOLOGY AND A HISTORICAL PARADIGM ---------- 18

D. LEARNING FROM GAMES ---------- 26

III. GAMING METHODOLOGY: APPLICATIONS ---------- 32

A. CLASSIFICATION OF GAMES ---------- 32

B. GAMES STRATEGISTS PLAY: SOME SPECIFIC APPLICATIONS ---------- 47

IV. THE LIMITATIONS OF GAMING ---------- 57

A. THE INNER LIMITS OF GAMES: PROBLEMS WITHIN THE BLACK BOX ---------- 57

B. THE OUTER LIMITS OF GAMES: PROBLEMS BEYOND THE BLACK BOX ---------- 60

V. CONCLUSIONS ---------- 70

A. THE WAR GAME: A DOUBLE-EDGED SWORD ---------- 70

B. UNLOCKING THE POTENTIAL OF WAR GAMING -------- 74

APPENDIX: GLOSSARY ---------- 81

LIST OF REFERENCES ---------- 84

BIBLIOGRAPHY ---------- 89

INITIAL DISTRIBUTION LIST ---------- 92

I. INTRODUCTION

War games are currently enjoying a revival of interest and popularity within the American defense community. Strategists, analysts, and policy-makers alike are turning more and more to gaming as a medium for education, planning and discovery. (Hoffman, 1984, p. 820) War games facilitate multi-dimensional examination of strategic issues without risk and and at relatively little expense:

> Gaming provides a means of gaining useful experience and information in advance of an actual commitment, of experimenting with forces and situations that are too remote, too costly or too complicated to mobilize and manipulate, and of exploring and shaping the organizations and systems of the future. (McHugh, 1966, p. 1-25)

To an era obsessed with "static measures" and "bean counts" gaming offers a critical yet refreshing opportunity to study the dynamic qualities of strategic affairs.

This thesis investigates the nature, utility, and limitations of war gaming as a tool for the American strategist. The term "game" has a number meanings, several of which are relevant to defense policy studies. Broadly speaking, a game is a competition between two or more decision centers, none having perfect intelligence on the other (Quade, 1975, p. 199) A more refined definition, and one of greater significance to the strategist, specifies the game as a competitive or conflict situation in which

opposing human players influence events with their own decisions.*

Two strategically important categories of gaming are the "war game" and the "strategic game." The war game is simply a game that simulates political or military conflict without operating real forces. The strategic, or political-military game is a type of war game that examines a full range of political, military, economic, and social issues with regard to a nation's overall security policy (Brewer and Shubik, 1979, p. 377). Within the context of this thesis, all gaming is regarded as a human function; every game must contain some explicit decisionmaking by one or more human players. And since the concern is solely with strategic issues, the terms "game," "war game," "strategic game," and "political-military game" are used interchangeably.

Gaming is a methodology, related in many respects to the quantified analytical techniques favored in many contemporary policy studies. Yet the benefits of gaming stem not simply from quantification, but more so from its special ability to approximate the effects of human behavior in a simulated environment. True games use real people playing out roles. Players make decisions in the game much as they would in the real world, and they must live with the consequences of those

---

*See Appendix for a complete glossary of terms used in this thesis.

decisions. The processes of a game resemble those of actual human history in that causation, motivation, and contingency are key elements. Because of this resemblance, games are a source of artificial experience, whereby players learn from decisionmaking opportunities, and synthetic history, from which analysts and strategists may extract useful information.

Much recent research on strategic war games is the product of operations research analysts (generally referred to as "analysts" within this paper) educated in the quantitative methodologies. This thesis takes a different and often-neglected approach by examining strategic games from an orientation of history. Chapter Two introduces gaming as a historical methodology closely related to, and reliant upon, analytical processes. Chapter Three describes the structure of modern war games and offers some salient examples of strategic gaming application. By assessing some of the problems and distortions associated with games, Chapter Four attempts to identify their methodological limitations. The thesis concludes with Chapter Five: an appraisal of the pros and cons of war games, and some suggestions on how the strategic community may best exploit their potential.

Whereas most analysts think of gaming in terms of results, rigor, and rationality, the intent here is to look beyond the "Black Boxes" that typify their orientation. The

perspective of this work is that of the strategist and historian; the focus: process, practicality and plausibility.

II. STRATEGIC GAMING AS A HISTORICAL METHODOLOGY

Strategic gaming, and indeed war gaming in general, is at heart a historical methodology. This chapter focuses on the relationship between gaming and history in several ways, starting with an overview of the historical origins of contemporary strategic gaming. Next, the historical character of gaming is elaborated upon by comparing war games to analytical methodologies. A historical paradigm is then presented, and the nature and processes of gaming are evaluated in light of this paradigm. Finally, the different ways of acquiring knowledge through the gaming methodology are briefly examined.

A. THE HISTORICAL ORIGINS OF CONTEMPORARY STRATEGIC GAMING

Although war games date to ancient times, modern strategic gaming traces its roots back to the decade or so following World War II. With the United States only recently thrust into its role as superpower, strategic thought was in ferment; much intellectual energy was being expended to meet the unprecedented challenges of a new atomic age. The awesome destructive power of nuclear weapons drove strategists to rethink the fundamental nature of war: whereas in the past strategy had dictated the employment of armaments, nuclear weapons now directed the shaping of strategy. To nations

armed with weapons of mass destruction, all conflict came under the nuclear shadow, and all important decisions in conflict were influenced by perceptions of the balance of strategic nuclear forces. The horrible potentials of nuclear war caused forward-thinking theorists to shift the emphasis of strategy from fighting wars to preventing them. Deterrence became the primary goal of military strategy.

Among other approaches, war gaming soon emerged as a promising methodology for the teaching and study of national security problems. While traditional war games normally treated only military matters, the exigencies of deterrence required examination of non-military solutions as well. Working at various universities and research organizations, political scientists like Herbert Goldhamer and Lincoln P. Bloomfield developed "political gaming" techniques. In addition to considering military measures, these new methods introduced political and social factors as instruments of strategy by eschewing "...schematic simplification of the international political situation..." and attempting to "...simulate as faithfully as possible much of its complexity. The government of each country was to be represented by a separate player or group of players." (Goldhamer and Speier, 1959, p. 73)

The pioneer efforts of early political gamers were soon eclipsed by the analytical approaches of the "McNamara era." During the 1960s and 1970s, many defense officials came to

rely heavily on analysis to provide more rational bases for national strategies (Kaplan, 1983, pp. 248-257). Many war games of the era were inclined to reflect the same assumptions and attitudes that characterized these rigorous methodologies.* Typical was the Strategy and Force Evaluation Game (played at Rand Corporation in 1961-62), which asserted that strategic force requirements "...could be calculated with reasonable precision, defining cost effectiveness as the combat effectiveness of each system per dollar of outlay." (Brown and Paxson, 1975, p. 35)

Despite the existence of some gaming centers (like the Joint Chiefs of Staff), gaming methodology was generally not emphasized as a tool for strategic studies during the 1960s and 1970s. This was mainly due to its excessive time demands and supposed imprecision. In their drive to eliminate uncertainty and ambiguity from the policy formulation process, influential analysts favored the rigor and speed of mathematical models and computer simulations (Allen, 1987, pp. 136-140). But such analytic techniques stressed measurable parameters and minimized more indeterminate properties. Consequently, much of the period's strategic analysis (and policy) was naturally predisposed toward

---

*Atypical of the period were the political-military games begun in 1962 by the Joint War Games Agency (JWGA) of the Joint Chiefs of Staff. See Chapter 3 for a description of the present-day activities of JWGA'a descendant, the Force, Structure, Resource and Assessment Directorate (J-8).

quantified technical and fiscal subjects; "squishy" political, social, and psychological factors were usually not considered (Bracken, 1984, pp. 796-797).

Dissatisfied with the results of policy built by narrowly-defined quantitative methods, some strategists, analysts, and policy-makers have revived interest in broad-based strategic gaming. "There is a growing need to game the political-strategic aspects with the military aspects," wrote analyst Alfred H. Hausrath in 1971, "treating both as parts of the same international conflict situation. The problem is to find a means of considering the pertinent, subjective, and slowly maturing factors without distorting the objective data and quick-reacting effects." (Hausrath, 1971, p. 224) A decade later, the Andrew W. Marshall, the Defense Department's venerable Director of Net Assessment expressed concern over "...the inadequacies of the standard strategic exchange models and calculations..." and challenged the defense community to explore gaming as a supplement to conventional analytic procedures (Marshall, 1982, p. 47).

Other experts also extol the virtues of gaming. Garry D. Brewer (a well-known critic of analytic practices) observes:

> Most of the real problems confronting decisionmakers are far less technical than the preponderance of techno-engineering studies would suggest. Even in those areas where technical matters seem to figure prominently...the crucial role of political and institutional factors almost invariably matters more. If those in the defense policy process have learned nothing

> else in the past twenty to thirty years, it must be that narrow technical analysis, no matter how elegant or scientific in appearance, are probably as bad or worse than no analysis at all. (Brewer, 1984, p. 810)

How can these analytical shortcomings be ameliorated? Brewer suggests gaming as one solution: "Thought of as a means for exploration and discovery, manual gaming presents an opportunity to enrich and balance analysis conducted for other purposes." (Brewer, 1984, p. 812)

So the current renaissance of gaming as a methodology for strategic studies is largely stimulated by the need to get at issues beyond quantification. "Today's multilateral defense issues are more difficult," remarks one strategist,

> existing and potential technologies more complex, and threats are more sophisticated than ever before....Future military operations will likely encompass increasingly sophisticated combined arms use of sea, land, air, and space assets to achieve strategic, operational, and tactical objectives. The complexity of these operations will be compounded by the different suggested strategies, logistical difficulties, competing demands for resource allocation, varying response times for the different types of forces, and the rapid tempo of modern warfare. Thus, we need more sophisticated simulations and better gaming mechanisms. (Masterson and Tritten, 1987, p. 117)

If games can provide some of the answers analysis cannot, analytic techniques contribute greatly to the capability modern gaming. The two methodologies enjoy a mutually beneficial relationship, and it is worthwhile to examine gaming in light of this symbiosis.

B. GAMING CHARACTERIZED: A "REASONABLE" METHODOLOGY

As the foregoing discussion suggests, gaming is not a strictly quantitative methodology; it considers many aspects of reality that are beyond mathematical expression. Gaming explores qualitative issues, furnishing a plausible, practical, or "reasonable" approach to strategic studies: "Important perceptual and procedural matters surface in the play of manual scenario games; they almost never do in computer-based analysis." (Brewer, 1984, p. 807) And while some components of games may be analytic, gaming is not analysis.*

Part of the symbiosis between gaming and analysis results from their similarities. Both methodologies rely on scenarios and other contextual elements to provide their functional foundation and boundaries. In addition, both approximate reality through mechanical elements; both use models, rules, procedures, and data bases to approximate real-world processes. Yet if gaming and analysis do bear some resemblance to each another, they also exhibit profound differences. These differences are manifest in their paradigm, purpose, and operation. (Perla and Branting, 1986, p. 6)

---

*The notion of gaming and analysis as "reasonable" and "rational" approaches (respectively) is a brainchild of LCDR Jamyie Durnan, USN (Durnan, 1987).

1. Purpose and Paradigm

With its roots in physical science, analysis assists in policy formulation by applying rational procedures:

> The physical sciences are the paradigm of analysis. Analysts build mathematical models of reality, take measurements to quantify the parameters of the models, and manipulate both models and parameters to learn about reality or to find the "best" solutions to the problems it poses. (Perla and Branting, 1986, p. 2)

Despite its ability to scientifically examine many elements of policy, analysis comes up short on matters outside the physical paradigm. When confronted with unquantifiable phenomena, such as most human behavior, analysts must either exclude them or simplify them beyond recognition. Analysis cannot effectively reduce the complex and often imprecise nature of human behavior to a series of algorithms. This is especially true in situations of human conflict, where analysis, by itself, "...can provide little insight into why and how a brilliant hunch, or incredible blunder, a bold gamble, or paralyzing indecision can destroy carefully crafted plans or turn ad hoc operations into decisive victories." (Perla and Barrett, 1985b. p. 78)

But gaming can capture some properties of human behavior (knowledge, emotion, character, etc.) that may lead to decisive victories or ignoble defeats. While analysis focuses on physical phenomena, gaming emphasizes "human" matters; it attempts to provide a sound, if subjective, basis for policy by addressing a phenomenon that defies

quantification: human decisionmaking.* Games do not simply address physical parameters and processes with mathematical models. By placing live humans in decisionmaking roles, games "model" human parameters and processes. If analysis is the stepchild of physical science, gaming is more closely related to history: "Thus to exploit wargaming, the physical sciences must give way to a new paradigm, that of history." (Perla and Branting, 1986, p. 3)

2. Operation

Gaming and analysis also differ in how they operate. Analytical approaches are best described by adjectives like deterministic, optimal, replicable, precise, and model-creating. Key words for gaming methodology are: realistic, unpredictable, broad, subjective, process-oriented and model-using.

Analyses are designed to simplify variables and focus narrowly on specific pieces of reality, and analytic procedures must be replicable to be useful. They are performed over and over following rigid, predetermined event sequences. Using this iterative approach, data may be progressively manipulated and refined in pursuit of an

---

*Analytical methods also model human decisionmaking, albeit indirectly. As Dr. Peter P. Perla has observed, the analytic process is implicitly fraught with human judgment:

> Analysis focuses on the physical processes of reality, adopting a philosophy of approximating those processes with mathematics that can, in some sense, be "solved." Although the mathematics may be "objective", the choices of models

optimized outcome. Thus tangible, substantial results are produced by analysis, and they are frequently expressed in the form of a model.

In contrast, gaming is process-oriented. Replication may not be as important as realism, so games usually feature a dynamic, unpredictable course of events that better approximate real human affairs. As a result, strategic games permit players and policy-makers to concentrate on broad issues rather than precisely defined variables. Optimization is less appropriate in these types of political-military games; the best games provide a wide variety of issues and potential developments for the strategist to ponder.

Gaming and analysis each function well within its own paradigm. If analysis often fails to provide the policy maker with practical insight, gaming cannot always address important matters more suited to quantification. In truth, the prudent analyst and wise strategist will use both Reasonable and Rational approaches to develop policy:

> Large-scale political and operational decisions modeled, however imperfectly, in a wargame can sometimes have more important effects on the conduct and utility of an operation than the detection range of a sonar or the probability of accurate weapons placement given detonation.

> and parameters, underlying assumptions, and sometimes the method of solution are all subjective ones. (Perla and Branting, 1986, p. 2)

Decisions simulated through Analysis are essentially prefabricated; they are fixed by the analyst even before the model is run. In gaming, on the other hand, decisionmaking can be an explicit, ongoing process.

> Yet, without the understanding of the latter factors provided by good analysis, the decisions can be too abstract, too sterile, and their effects assumed rather than assessed. The gaming and analysis pieces must fit together. (Perla and Branting, 1986, p. 10)

Models that are outputs from analysis are often inputs into the gaming process, and any analytical data generated through political-military games is all the more reliable for having been subjected to the "reality test" of human competition. But from the strategist's viewpoint, analytic models are essentially tools that help determine the results of player decisions. To him, the most important learning from games is derived from the experience, study and interpretation of human decisionmaking and its effects. In this regard, the strategist's best "model" is history.

C. GAMING METHODOLOGY AND A HISTORICAL PARADIGM

1. A Historical Paradigm

The power of gaming as a methodology lies in its close correspondence to the historical paradigm. One version of this paradigm portrays human history as a cyclic process built on three elements: Situation, Nature, and Human Decisions.

Even though history is in truth a perpetual flow of events, it is often necessary for humans to divide it into comprehensible chunks. Herein lies the concept of Situation, which is basically an appraisal of the state of affairs, a view of existing conditions and circumstances frozen in time

and space. Situation provides a cognitive reference point upon which the human mind can act: Human Decisions are made that change or maintain the Situation.

Nature is the vehicle through which physical processes (directly) and human decision-making (indirectly) influence the Situation. Situations determined by Nature, independent of any human involvement, are within an exclusively physical paradigm; they are part of natural history (see Figure 1). Human history superimposes human behavior upon the physical paradigm. The historical paradigm supplements purely natural actions with those affected by Human Decisions (see Figure 2).

Decisions are arrived at when the human mind compares its perception of the existing Situation with its expectations of what the Situation should be. If change is warranted, a decision is made to initiate certain physical actions that will favorably modify the Situation. If perceptions meet expectations, a decision may be made to do nothing (which is an action in itself).

Taken together the three elements of this paradigm capture the character and flow of human history: humans appraise situations and make decisions that translate into physical action, thus creating "new" situations. Historical knowledge is derived from the study and interpretation of this never-ending process and its yield. In much the same

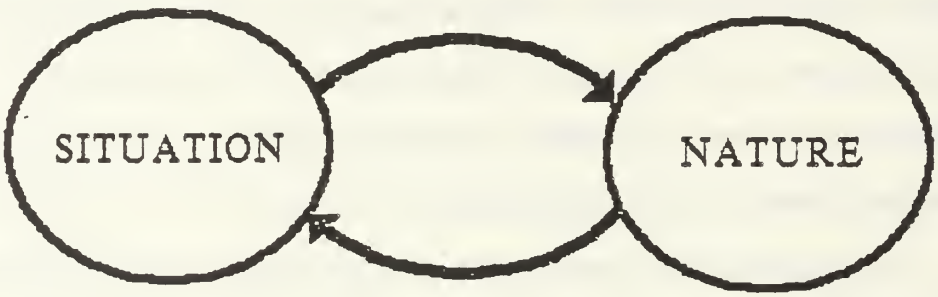


Figure 1: A Physical Paradigm

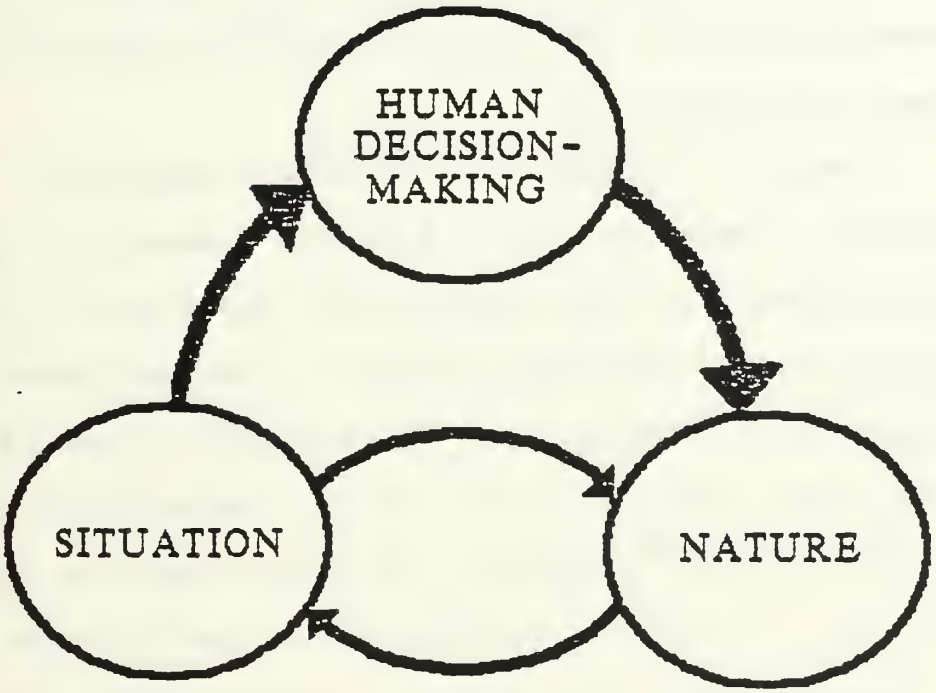


Figure 2: A Historical Paradigm

way, knowledge can be extracted from the synthetic histories produced by gaming.

2. The Gaming Methodology

Gaming methodology is founded on three structural components: Scenario, Participants, and Mechanics, which correspond closely to the three elements of the historical paradigm (see Figure 3).

Scenario resembles the historical paradigm's "Situation" in many respects. A game's Scenario is in essence a summary of some hypothetical situation (a view of conditions and circumstances frozen in time and space) upon which play is to be premised. The strategic Scenario usually includes a full correlation of forces: an accounting of military, political, economic, and other resources available to each side. It should also explain to participants what their intended goals and interests as game actors are, as well as describe the organizational relationships through which they exercise command, control, and communications.

As with real-world situations, the game's Scenario may be altered by decisions. Within a game, Scenario alteration occurs through the operation of Participant and Mechanical components, which respectively simulate the historical paradigm's Human Decisionmaking and Nature. In this sense, Scenario is both an input an an output of the gaming process.

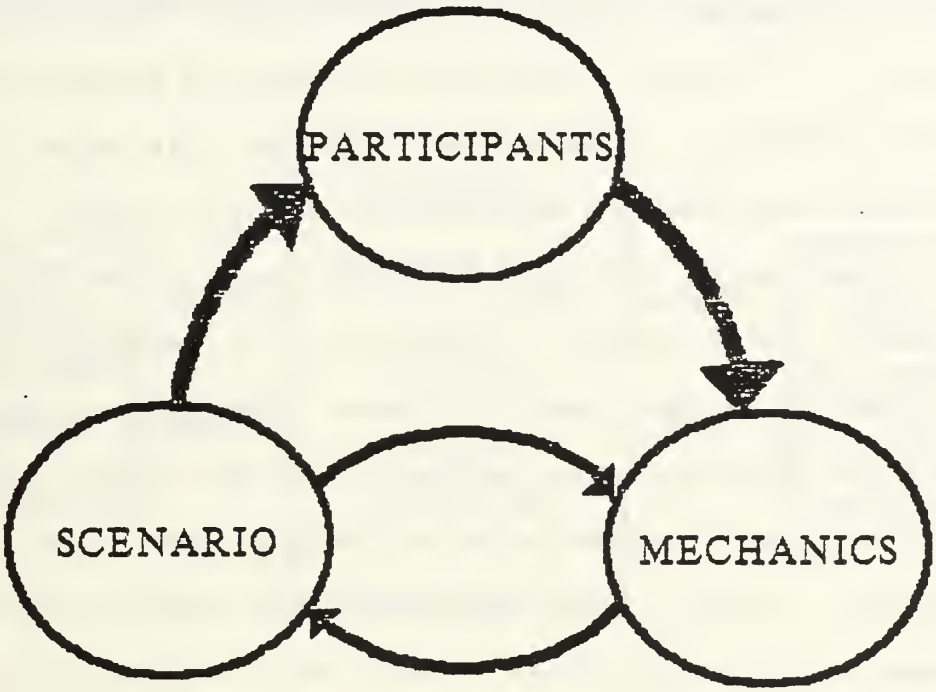


Figure 3: The Gaming Methodology

Within the historical paradigm, human decisionmaking is the font of action. In like fashion, game decisionmaking is performed by human Participants functioning as either players or umpires. The role of players is straightforward. Their decisions determine the game "moves"; they initiate actions to influence course of the game and modify the original scenario. They are assisted in this capacity by umpires and controllers on the game Control staff.

Umpires or controllers serve three principle functions: adjudication, regulation, and communication. Through adjudication, umpires assess interactions between players and determine the outcome of player moves (see Figure 4). Regulation is affected by enforcing game rules and procedures, and by improvising when game events move beyond the scope of existing rules. Once their adjudication and regulation decisions are made, controllers must communicate results to the players, as the general flow of information within the game is primarily their responsibility.

In accomplishing their duties, umpires operate the game's Mechanical components: the models that simulate real-life physical processes. While they may be manual or machine operated, all models share certain characteristics: all incorporate the rules and procedures, and most use data bases of one variety or another. Within a gaming context, models are tools. They serve to simulate physical processes such as movement and weapons effects, and using artificial

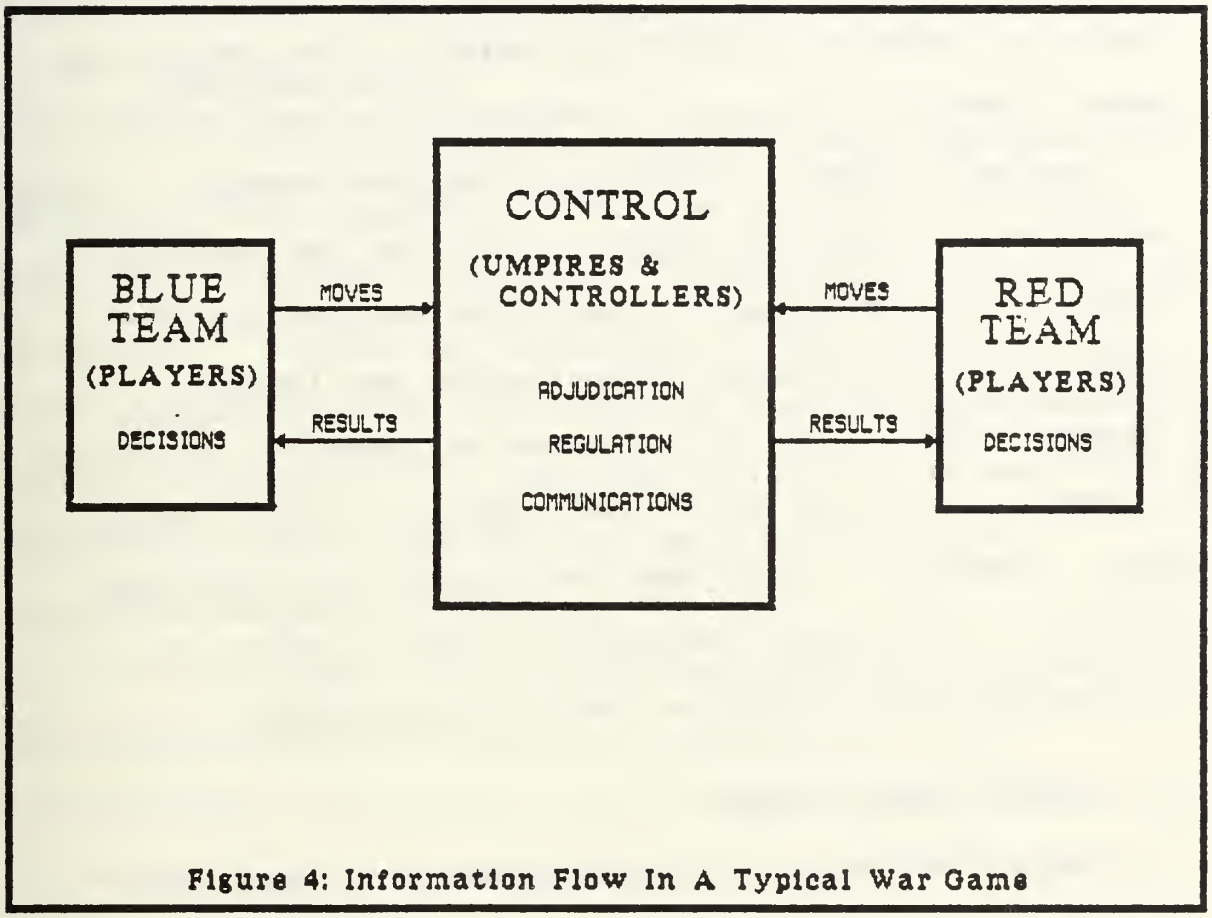


Figure 4: Information Flow In A Typical War Game

intelligence techniques, they may approximate important (but not all) aspects of human decisionmaking.

Operating in a cyclic pattern almost identical to the historical paradigm, gaming methodology requires Participants to make decisions (Human Decisionmaking) that set in motion Mechanical components (Nature), which in turn modify the game's Scenario (Situation). Emerging from this process is a "...synthetic history composed of imagined events...", which can often "...disclose features for which the reasons - ascertained by subsequent examination and reflection - constitute well grounded understanding and insight." (Sterne, 1966, p. 64) In circumstances where no historical accounts exist, such as in the study of future conflict, a game's synthetic history may be an important knowledge source. It can supply strategists with a wealth of information and insights not otherwise available.

D. LEARNING FROM GAMES

The strategist may learn from games in three ways: through the experience of game play, research of game history, and involvement in the game development process (Perla, 1985a, p. 13). By playing in a game, the strategist can personally experience many facets of strategic decisionmaking. He may also acquire insights by studying game-generated history, which is similar to the real thing in that its lessons are seldom obvious; they are mainly

discovered through research and reflection. To fully understand how its underlying assumptions effect player decisions, the strategist should be familiar with how the game was developed. And by learning about the game, he also learns more about the reality upon which the game is based.

1. Game Experience

Vicarious decisionmaking in war games may furnish the strategist with experience otherwise acquired only through the "heat of action." "Gaming..." a political scientist once observed, "...offers an opportunity to play out a strategy over a period of time and to observe concrete consequences of decisions. Moreover, the importance of theory is easier to demonstrate when a system is actually in operation." (Guetzkow and others, 1963, p. 12)

In the game, as in real life, the player learns by developing and executing plans, and assessing their effectiveness. He does not learn "how to react to specific situations,..." but rather to become "...aware of factors that influence the outcome in conflict situations," such as command and control, geography, intelligence, and logistics. (Lawrence, 1986, p. 22) A good war game trains the strategic mind to exploit enemy weaknesses and friendly strengths, and to seek advantage from emergent circumstances. Games also cultivate an appreciation for an opponent's strategic culture, and they give players a first hand "feel" for the uncertainties of conflict wrought by the "fog of war."

2. Researching Game History

Research into game history may be conducted with an eye towards analytic results, or historical interpretation, or both (Thompson, 1983, p. 85).

Certain war games are conducted to generate numerical data for analysis, and these types of games generally place heavy reliance on mathematical models, especially computer models. The game itself is used to impart strategic reality to the data; the test of human competition can help establish the models' credibility. Despite the benefits of using a war game as an analytic tool, researchers must be wary of placing too much credence in their findings, as "...it is usually a mistake to expect wargames to provide detailed quantitiative support for proving theories." (Perla, 1985a, p. 17) Good war games are reasonable but imperfect representations of reality, and the analyst attempting to draw realistic conclusions from game-based data should do so only with extreme caution.

Historical study and interpretation is probably a better means to extract relevant information from most political-military type games. Since he is mainly interested in the processes and effects of human decisionmaking in these games, the strategist can readily apply historical methods to his investigations. If history is to teach anything about human behavior (besides "facts")," writes one game historian, "it must do so through study aimed at discovering why plans

took the course they did, and why events occurred." (Sterne, 1966, p. 65) Thus the strategist/historian attempts to establish the causes of game events, and to assess the motivations behind player decisions. He must also sort out and evaluate the meaning of contingencies, or chance events, which occur when "... two or more chains of causation cross in an unpredictable and apparently chance fashion." (Shafer, 1980, p. 32) Through sound utilization of these and other principles of historical research, the strategist can derive meaningful generalizations from game history. These generalizations may then help formulate hypothesis to be tested by other means.

3. The Process of Game Development

The game development process creates and fuses game components into a realistic, workable system of simulation. Because the process is a continuous, circular effort, it may be thought of as a development cycle, or "gaming loop." (Perla, 1985b, p. 76) The gaming loop is divided into two phases: Design and Play.

During the Design phase, the game designer fashions his thoughts and observations into game components. As a first step, he must establish the game objectives, for they are the fundamental determinant of game design. To this end, he should answer the questions: what issues will the game examine? What are the player roles? What type of decisions

should be made? What kinds of interactions should occur? And, how can game design best realize game objectives?

Without loosing sight of his objectives (sometimes a very challenging task in itself), the designer next develops his game system. He will more than likely conduct extensive research on both the situation and processes (both physical and human) he wishes to portray in the game.* Armed with this knowledge, he creates the game's context, and devises both participant roles and game mechanics. The entire process should include cross-checks that verify the accuracy and adequacy of any data used in the game's models, as well as the operation of the models themselves.

Play commences as soon as game development is complete. In effect, the game is tested each time it is played, rendering game play an essential part of the overall game development process. Effective play will raise questions and issues that challenge the game design and eventually translate into improvements on that design. For example, participants may discover that the game's scenario

---

*One commercial gamer has compared game design to writing a book:

> Designing a game is very much like writing a book: the designer - as does the author - gathers a great deal of information, marshals it, transforms it into a product, polishes it through many rewrites, and then presents the finished product for consumption... (Berg, 1983, p. 31)

And like a book, the game is (or should be) subject to continuous improvement and revision through feedback from players and researchers.

is too contrived, or that its models do not provide reasonable results. During game play, both players and designers should "ask the right questions": did the players learn anything new by their game experience? Did they learn as the game designer/sponsor intended (did the game meet designer/sponsor objectives)? Does the game provide reasonable outcomes? Does it handle unforeseen situations effectively? Does it run smoothly? Answers often lead to further revisions and improvements in the game, thus creating a more accurate representation of reality (and a more effective tool for the strategist). (Perla, 1986, p. 15)

Lest the gaming loop appear to be an end in itself, perhaps it is best to rename it the "Knowledge Loop" to better emphasizes the fundamental purpose of gaming methodology: not simply to produce good games, but to produce useful knowledge. Involvement in the knowledge loop of a game compels designers, analysts, participants and policy-makers alike to examine closely its underlying assumptions. The knowledge loop thus builds an informed, balanced perspective, and a healthy skepticism with which to assess the game's true lessons. Judiciously applied, gaming methodology can lead to improved understanding of real issues and real decisions.

III. GAMING METHODOLOGY: APPLICATIONS

Having introduced gaming as a historical methodology for strategic studies, it is now appropriate to consider its usage. The latter portion of this chapter describes several gaming applications of interest to the strategist, but to fully appreciate these games it is first necessary to become acquainted with their general composition. The next section, entitled "Classification of Games," outlines the basic structural attributes of war games.

A. CLASSIFICATION OF GAMES

War games may be classified in accordance with a variety of standards. The six most common criteria are delineated here: Level of Play, Level of Simulation, Structure of Play, Information Limits, Number of Sides, and Purpose.

1. Level of Play

Level of play describes a game in terms of Geographic Scope, Level of Conflict and, most important, its Level of Decisionmaking.

As necessitated by the game's objectives, player roles may be assigned at any level of decisionmaking, ranging from small unit commander to national command authority. Level of decisionmaking also establishes a level of "jointness", or the extent to which the game requires

inter-service and inter-agency cooperation and combined effort (McHugh, 1966, p. 1-16). At the level of frigate captain, for example, game play will deal principally with naval operations; activities of ground forces, or diplomatic endeavors, or the impact of domestic politics are largely ignored.

Most games of interest to strategic planners designate decisionmaking at Fleet or Army level, or higher, thus creating a need for combined operations. As a result, many organizations will be depicted in the game, including all military services, several executive departments and agencies, the legislature, allies, and even a number of private entities (business, the media, etc.).

Level of decisionmaking may also bears on selection of an appropriate level of conflict and geographic scope. By focusing on a single locality, a larger region or theater, or encompassing the entire planet, a game's geographic scope describes its spatial domain. Geographic scope also helps define the character of military operations found in a game. They may occur in any of several environments: air, sea, land or space; and on any of several planes: tactical, operational, or the sphere of interest in this thesis: strategic (Perla and Barrett, 1985b, p. 72). And within the game's geographic setting, a certain level of conflict will be simulated. A game might portray conflict as limited local

strife, or global nuclear war, or anywhere else along the so-called escalation ladder.

2. Level of Simulation

Level of simulation addresses the types of models that support a game. There are two basic classes of simulation used in games: manual and man-machine. Often associated with the latter is another category: the fully automated simulation.

a. Manual Games

Games in which models are operated by hand are termed manual games. They are generally cheaper and easier to set up and play than games using more elaborate computer based models, although the advent of personal computers is changing this situation. Another advantage to manual models is their flexibility; it is a relatively simple matter to alter them to accommodate unforeseen circumstances that may arise in a game.

The models of most manual games consist of tables and/or graphs that provide the outcomes to a given situation, such as combat. An important benefit of such manual models is that they are fairly transparent; players can readily see and understand the models' logic and procedures. Among other things, this makes manual models useful as decisionmaking aids, since they provide players with ready information on how reality is expressed within the game's context (Perla, 1986, p. 19).

Manual games also possess some disadvantages. Hand operated models can be slow and cumbersome, a serious detriment if time is limited. In addition, they tend to be labor-intensive, a distinct drawback for the large, aggregated games of global proportion often required by strategists.

b. Man-machine games

Most man-machine games use automated models to carry out the mechanical functions of gaming. By applying state-of-the-art techniques in artificial intelligence, some models also approximate certain aspects of human decisionmaking.*

Modern computers offer significant advantages to gaming. First, the incredible speed of automated systems can dramatically increase the number of games being played, "instead of running one or even a handful of games and simulations each year, modern simulations centers will be able to run literally hundreds of alternate cases." (Hoffman, 1984, p. 820) Secondly, access to war game methodology can be widely improved through portable personal computers. The advent of micro-chip technology has also greatly expanded the working capacity of even the smallest computers and given rise to a third benefit: the ability to

---

*One notable application of artificial intelligence is found in the Rand Strategy Assessment System (RSAS). A description of RSAS is supplied later in this chapter.

handle large quantities of variables, thus allowing for more detailed (and hopefully more realistic) simulations.

Unfortunately, many computer models lack the transparency of their manually operated counterparts, a condition that can lead players to mistrust or misunderstand outcomes in man-machine games.* Computer-based games can also be difficult for players to learn, since much of their reality is hidden within the Black Box: "...players can no longer see the relative odds generated by the models and so find it difficult to incorporate expectations about outcomes into their decisions." (Perla, 1986, p. 20)

c. Fully Automated Simulations

Although they are related to gaming, fully automated simulations in themselves are not games, since they substitute computerized decision rules for human decisionmakers. Recall that the definition of gaming requires human play, while simulations do not:

> The spectrum of gaming extends from the manual game to a computer-assisted game in which human decisions are made only at critical intervals. There is a further extension of this spectrum to a complete computer procedure, more appropriately called a simulation, where there is no element of human decision involved in the complete run of the conflict situation. (Hausrath, 1971, p. 127)

Simulations of this type are frequently used in analytic studies, since they produce quantitative, replicable results.

---

*See Chapter IV for more discussion on the limitations of automated models in games.

3. Structure of Play

Move schedules, Time Representation and Degrees of Freedom are the primary determinants of a game's play structure. First, move schedules can be set up that allow player "turns" to occur sequentially or simultaneously, or any combination thereof. Since they better replicate real-world events, simultaneous moves are generally preferred in strategic gaming, with the added advantage that they take less real time to execute. On the other hand, sequential gaming is a necessity when the Control group is small or nonexistent, or when some special circumstances exist. (Jones, 1986, pp. 8-9)

A second factor in structure of play is time representation. Most games are played with turns of fixed duration, but some "critical event" games use a flexible game clock. In order to reduce "dead time" (where no meaningful activity occurs), these games proceed from event to event, rather than through fixed intervals (McHugh, 1966, p. 1-24).

Finally, play structure also establishes the degrees of decisionmaking freedom allowed game umpires. Games are classified either "Free" or "Rigid", depending on the amount of controller subjectivity permitted. Free games (also referred to as "seminar" games) function with a minimum of rules, relying instead on umpire judgment to control play and determine outcomes to player decisions. Because the rely so heavily on personal knowledge and judgment, free games may

run fairly quickly, and require minimal supporting infrastructure. They are especially appropriate for dealing with highly subjective issues like terrorism and arms control negotiations, and since they give the instructor/umpire ready ability to manipulate events, free games are also well-suited for educational endeavors and for stimulating players to surface new ideas.

Where the worth of a free game "...depends on the competence of the Controller..." the value of a rigid game "...depends on the competence of the people who formulated the rules." (Hausrath, 1971, p. 124) Rigid games prescribe rules and procedures that replace much controller opinion in conducting the game's adjudication, regulation, and communication processes. Some rigid games also limit player decisions to specific options, or require players to base their decisions on certain rules or doctrines (McHugh, 1966, p. 1-24). Rigid or "system" games are most useful when isolation and manipulation of variables is desired. Since they can be designed to produce measurable results, these games are often used in analytic studies.

4. Information Limits

Information limits regulate the quality and quantity of intelligence available to players within the game. As in real conflict, each side will base its decisions in part on knowledge of opponent attitudes, intentions, and resources.

Thus the flow of information (or lack thereof) can significantly impact on game events.

As a function of their information limits, games are grouped into one of two categories: open or closed. An "open" game permits free and complete access to information on one's opponent. When intelligence is limited to more closely approximate real-world information flows, the game is considered "closed." Because of their ability to better simulate the "fog of war", closed games are most commonly favored for planning purposes (McHugh, 1966, p. 1-18). Unfortunately, they sometimes tend to move slowly, and often require much infrastructure and support staff to conduct. Open games have proven more useful when time, space or umpires are at a premium, as they are relatively fast and easy to run (Hausrath, 1971, p. 125). They are best suited for educational applications, and for discovery of new ideas and alternative futures.

5. Number of Sides

The number of teams or sides participating in a game may vary from one to many. One-sided games place a single decisionmaking team against "Nature", as represented by a Control group or a computer simulation. Such games are often used for educational purposes, as they allow the instructor (as Control) to manipulate scenarios and outcomes in order to highlight player errors, and reinforce specific ideas and strategies (McHugh, 1966, p. 1-17).

The most common structure for strategic games is two-sided; teams represent two opposing nations or alliances, with Control acting as intermediary (Jones, 1986, p. 6). Another style used to examine strategic issues is the multi-sided game, which attempts to capture the complex and often confusing international environment by fielding three or more teams, each representing a different nation or actor. A variation of the multi-sided game features several teams portraying a single side, thus allowing simultaneous but varying attempts to beat the opponent*.

6. Purpose

More than anything else gaming methodology deals with ideas; the way a game treats ideas is the basis for its classification by purpose. A game designed to teach ideas is termed "educational", while games that aim at organizing, analyzing and testing ideas is designated for "planning." "Discovery" games are intended to search for and reveal new ideas.

No single game can truly be classified in just one category, as every game possesses attributes of discovery, planning, and education. For example, an educational game helps students discover ideas new to themselves, even if those ideas are not original. A planning game will likely

---

*An illustration of the multi-side/single-nation game is the parallel structure used in some political-military seminar games, as described later in this chapter.

turn out to be an enlightening and educational experience for some of its participants. One quality possessed by almost all games is integration: by bringing people of different backgrounds and outlooks together, the game is usually an "idea-sharing" device. Like few other experiences, the interaction of players (and designers and analysts, and policy-makers too) in a game fosters intellectual exchange in which ideas are communicated, evaluated, and refined.

a. Education/Advocacy

Gaming has long been utilized as a learning tool. The first "modern" war game, introduced in 1824 by Johann von Reisswitz, was quickly adopted as a training device for Prussian officers (Hausrath, 1971, pp. 6-7). In 1894, the U.S. Naval War College established gaming as a regular part of its curriculum, and has remained a leading war game center ever since (McHugh, 1966, p. 2-44). Within the educational environment, gaming supplements conventional teaching techniques by allowing students to actually experience the subject matter, see their ideas in action, and safely learn from their mistakes.

The importance of games in strategic education is recognized by both academics and strategists. In 1955 a professional war gaming conference held at the University of Michigan declared gaming a vital element in the education of senior military officers (McHugh, 1966, p. 1-26). More

recently, Lieutenant General Richard D. Lawrence, President of the National Defense University, remarked:

> As a pedagogical tool, wargaming has advantages that few other teaching methods offer. Wargaming helps overcome the barrier that so often separates theory from applications, because the student can test theories by applying them to "simulated" situations and observing the results. (Lawrence, 1986, p. 22)

War games can teach ideas as they encourage students to experiment and expand their horizons in a risk-free environment. By helping to clarify abstract ideas, they may supplement and build upon knowledge acquired through other means. Games are especially suited to improve understanding of a number of strategic issues, including: the use and nature of national policy instruments, strategic decisionmaking processes (both own and opponent's), intelligence planning and collection, and the role of signaling and communications. They also offer a means to evaluate how well students take aboard new concepts. (Lawrence, 1986, p. 23)

Employed as advocacy tools, war games can also teach outside the classroom. Strategists and analysts often design and conduct games meant to show others the merits of a new idea, system or strategy:

> A competent designer can build a bias of almost any kind and degree into a game or simulation. Advocates of specific policies or weapons systems can load the dice so that the [war game] is most likely to produce the results they want to see. (Brewer and Shubik, 1979, p. 14)

Such advocacy games, however, should not be taken at face

value. "Any advocacy espoused as the result of a wargame, without supporting analysis," warns one naval gamer, "should be exposed and questioned." (Euliss, 1985, p. 98)

b. Planning

Some authorities credit the Chinese strategist Sun Tzu with the first employment of games as military planning aids around 500 B.C. (Kapper, 1981, p. 22). Certainly planning and evaluation are important use for war games today, and possibly the most prevalent. In a survey of models/simulations/games (MSGs) published by Garry D. Brewer and Martin Shubik in 1979, over 85% of the MSGs examined listed a planning-related function as their primary application (Brewer and Shubik, 1979, p. 163).

Gaming supports the planning process by encouraging strategists to organize and test their ideas. Games can assist in strategy development, in originating and evaluating new operational concepts and doctrines, and in assessment of new weapons systems. By allowing planners to examine any number of own and enemy courses of action, games can aid in contingency analysis. (Thompson, 1983, p. 87) The full utility of gaming as a planning tool is suggested by some recent applications:

- evaluation of employment plans for strategic nuclear forces;
- evaluation of various force structures to support arms control negotiations;

- assessment of conventional warfighting capabilities, both friendly and opponent;
- examination and evaluation of the military/political aspects of national security policy and strategy; and
- evaluation of joint force operations. (Sims, 1987, p. 2)

Because they encourage unconventional perspectives, games can help planners and policy-makers identify and evaluate hidden assumptions. This is especially important when working with analytic methodologies, where assumptions may not be explicit. Used in conjunction with analysis, gaming helps validate and impart operational reality to models, generates outcome distributions for crisis and conflict situations, gives visibility to outliers, and aids in organizing and targeting information for further analysis (Martin and Olin, 1982, p. 55). Heavily computerized games are the natural preference of analysts for these ends.

From a practical standpoint, the most important planning application for gaming may be as an integrating device. Game experiences often serve as structured discussions where the "...integration of pertinent information and decisions usually raises new issues, helps confirm and qualify expected problems, points to omissions of consideration and even to potential solutions of problems..." (Euliss, 1985, p. 97) When used as a vehicle for group planning, war games can show how to fit the strategic pieces together. They can be designed to foster consensus by fusing

diverse ideas held by different people into coherent, workable plans. Conversely, games can be structured to facilitate innovative and independent thought with the hope of discovering new ideas.

c. Discovery

While most gamers recognize the war game's ability to reveal "what we don't know we don't know," the potential for gaming methodology as a heuristic device is still largely untapped (Perla, 1985b, p. 78). Yet, an imaginatively designed and competently run game is a stimulating experience; it can force participants to challenge existing paradigms and to shock them into "thinking the unthinkable." Such games give rise to whole new views of reality as they bring fundamental assumptions and conventional wisdom into question.

In its role as "paradigm-buster," gaming can help alter the strategic mindset of the participant in favorable ways. One advocate of gaming sees war games as means to "get away from Douhet," return to the strategic fundamentals first articulated by Sun Tzu, "and figure out how to get at the enemy's mind, strategies, alliances, armies, and cities, in that order."* Innovative techniques such as path games may

---

*Remark by Capt. Charles C. Pease USN, Ret. (Pease, 1987) Giulio Douhet was an Italian air force officer who, following World War I, strongly advocated victory through air power. Douhet postulated that air campaigns of terror bombing would quickly break the enemy's will to resist and

help reduce the "tunnel vision" of American strategic culture. Path games encourage players to pursue multiple paths towards some distant objective. They cover extended periods of time during which both strategies and force structures may undergo significant changes.** Someone with path game experience may be less preoccupied with short-term issues (a classic American foible), and focus rather on long term interests and goals having far greater import.

Serious application of gaming as a tool for systematic discovery of new ideas has only just begun. One notable example is revealed in the Defense Department's Office of Net Assessment, where a group of strategists under Andrew Marshall has merged gaming into a multi-disciplinary approach to develop long-term competitive strategies (Mann, 1987, p. 13; Durnan, 1987). If games devoted specifically to brainstorming new ideas and developing radical new perspectives are scarce, it must also be noted that most war games present some opportunity for "discovery", whereby unexpected results are obtained:

...the game sets up a process that by its nature produces a

---

compel his surrender. His theories helped inspire the strategic bombing campaigns of the Second World War, and are echoed in contemporary "assured destruction" doctrines. (Dupuy and Dupuy, 1977, pp. 995, 1024)

**Most conventional games are "state" games; they examine issues over a fairly short time span, during which force structures and strategies (and paradigms) do not fundamentally change (Masterson and Tritten, 1987, pp. 118-119).

dynamic sequence of actions, response and counteractions. This sequential process, once set in motion, moves ahead under a momentum of its own, often in quite logical and plausible directions not always foreseen. A kind of chain reaction takes place beyond the capacity of a single mind to anticipate. (Bloomfield and Whaley, 1965, p. 870)

B. GAMES STRATEGISTS PLAY: SOME SPECIFIC APPLICATIONS

Knowledge of war game structure and classification will help the reader better understand the game descriptions that follow. Three different games or game types are presented: Political-Military Seminar Games, the Rand Strategy Assessment System, and Global War Games. While they are by no means representative of the huge selection of games, both professional and commercial, available in the United States today, the three are of special interest to the strategist.*

1. Political-Military Seminar Games

(1) LEVEL OF PLAY: National command authority.
(2) STRUCTURE OF PLAY: Free.
(3) LEVEL OF SIMULATION: Manual (limited computer support may be provided).
(4) NUMBER OF SIDES: Usually two or three; sometimes more.
(5) INFORMATION LIMITS: Closed.
(6) PURPOSE: Education, Planning; some Discovery.

---

*Comprehensive listings of professional war games are found in: Quadripartite Working Group on Army Operational Research, Catalog of War Games and Combat Simulations, Office of the Deputy Undersecretary of the Army, Washington D.C., April 1982.; and Quattromani, A.F., Catalog of Wargaming and Military Simulation Models, 9th. ed., Studies and Analysis Gaming Agency, Organization of the Joint Chiefs of Staff, May 1982. In addition, a slightly dated index of commercial games is contained in: The Staff of Strategy and Tactics Magazine, Wargame Design, Hippocrene Books, 1983.

Political-military seminar games are a post World War II phenomenon, having evolved from the pioneer efforts of Dr. Herbert Goldhamer, who developed them at RAND Corporation during the mid-fifties. In their original conception, these seminar games were seen primarily as training devices, but their value for strategic planning was early recognized and expanded upon (Mandel, 1977, pp. 612-613).

Contemporary political-military seminar games blend political, military, economic, social, psychological, technological, and other elements into scenarios that address potential international crises. Within these simulated environments, players can examine the character of international crises while developing decisionmaking skills that may someday be applied in real-world situations. Game scenarios are diverse. They can be tailored to depict topical issues, such as terrorism or arms control negotiations, or they may focus on problems within a specific geographic region, like the Middle East, or Latin America, or Europe. Because of their flexibility and unique ability to capture important subjective qualities of international relations, seminar games are used by strategists to:

- identify national security interests, difficulties, and opportunities, and generate recommendations for strategy and policy;
- discover meaningful approaches to crisis management and develop contingency plans;
- identify and examine the nature and location of potential international crises; and
- assist the net assessment process. (Sims, 1987, pp. 3-6)

While they are by no means prolific, political-military seminar games have been played at several important seats of strategic thought. Besides the RAND Corporation, these include various other think tanks and universities (most notably MIT), all of the service colleges, the CIA, the State Department, and the Department of Defense (Kapper, 1981, p. 19). Possibly the most well-known center for political-military seminar games, at least within the strategic gaming community, is the Force, Structure, Resource and Assessment Directorate (J-8), an organ of the Joint Chiefs of Staff.

While a number of different game structures are available, the design of seminar games used by J-8 demonstrate two common variations.* Most J-8 games group players into three sides or teams. In an interesting departure from conventional gaming practice, one of the teams is always designated as Control; the game's controllers are players, rather than members of the gaming facility staff. The other two teams are placed either in an "adversary" or "parallel" relationship. In an adversary game, the two teams oppose each other as separate Red and Blue nations or actors,

---

*For example, eight different structures for political-military seminar games are suggested in: Rand Corporation Report N-2413-AF/A On the Adapting of Political Military Games for Various Purposes, by William M. Jones, March 1986.

while a parallel formation creates two teams representing the same side. The latter structure is especially useful for comparative studies, and is regarded as highly productive since it effectively plays two games in one (Sims, 1987, p. 5).

An important characteristic of the teams in many political-military seminar games is the lack of role assignments for individual players. Instead, each team acts as a corporate body. Starting with the initial scenario, the team discusses the issues at hand, evaluates the situation, generates strategies and options, develops a consensus, and finally submits its formal "move" to Control. With the moves of both teams in hand, the controllers conduct a similar discussion-evaluation-options-consensus process to arrive at outcomes. Their efforts usually result in a new or modified scenario. Each game turn repeats this cycle, normally for a total of three turns.

Of all the types of war gaming in use today, political-military seminar games, especially those conducted within the Departments of Defense and State, quite possibly have the most profound impact on policy. While there is some dispute on the true effectiveness of these games, the fact that high-ranking officials and officers sometimes attend, participate in, and endorse them is significant. (Brewer and Shubik, 1979, pp. 35,281; Visco, 1987, pp. 19-22)

2. Rand Strategy Assessment System

(1) LEVEL OF PLAY: Variable; national command authority to theater command levels.
(2) STRUCTURE OF PLAY: Rigid.
(3) LEVEL OF SIMULATION: Variable; fully automated or computer-supported human play.
(4) NUMBER OF SIDES: Two.
(5) INFORMATION LIMITS: Closed.
(6) PURPOSE: Planning, Education.

By blending the contextual richness and operational complexity of war games with the rigor and transparency of quantitative models, the Rand Strategy Assessment System (RSAS) has something to offer for strategists and analysts alike. Although RSAS is advertised is an analytic simulation structured as a game, when human players replace its computerized "agents" in decisionmaking roles, it is a game (Davis, Stan, and Bennett, 1983, p. 2). And according to one of its designers, RSAS is easier to use, more thorough, more rigorous, and faster than most political-military games (Shlapak, 1987).

Like most standard war games, the RSAS pits Red and Blue opponents against each other through a Control entity. In the case of RSAS, however, the Red and Blue "players", and Control, are all represented by computerized agents. Blue Agent is a depiction of the American/NATO national command hierarchy, while Red Agent portrays the Soviet/Warsaw Pact equivalent. Control consists of Green Agent, Force Agent, and the System Monitor. Third countries, pro-Red, pro-Blue, and neutral, are resident in Green Agent. Force Agent provides

the mechanism whereby forces are moved and fought, and the System Monitor coordinates interactions between agents, in addition to serving as the simulation's record-keeper.

Artificial intelligence (AI) techniques are used to approximate human national command level (NCL) decisionmaking for the Blue and Red Agents. The NCL models are called "Ivan" and "Sam", and the analyst/player may select any one of several "personalities" for each.* The personality chosen for Sam or Ivan determines the types of escalation guidance and national objectives each bring to the game. The decisionmaking models function by appraising the situation, and selecting potential courses of action, or "war plans" consistent with escalation guidance and national objectives. Using a "look ahead" routine, each war plan is tested for feasibility, and one is selected for execution. As neither Ivan nor Sam are allowed perfect intelligence on opponent actions and status, both models make these assessments and

---

*Ivan/Sam personalities are defined by four sets of traits: flexibility attributes, political attributes, warfighting style, and perceptual attributes. Under flexibility attributes, for example, Ivan may be flexible, limit-setting, or resolute in setting its objectives. At the same time, Sam's operational daring (a subset of warfighting style) may be characterized as daring, open, or standard. Provided with a number of different Ivans and Sams, each with a different personality, the RSAS user may select the Ivan or Sam that best conforms to a preferred image of American and/or Soviet decisionmaking style. (Davis, Bankes, and Kahan, 1986, pp. 38-41)

decisions under the "fog of war." (Davis, Stan, and Bennett, 1983, p. 4)

Once chosen, the war plan is sent to subordinate levels for execution. Decisionmaking below the NCL is handled by a succession of models which approximate real U.S./NATO and Soviet/Warsaw Pact command structures. Each of these subordinates follows the script set out by the NCL's war plan, and is capable of making limited adaptations to cover unforeseen circumstances. In addition, each war plan contains "wake-up" rules that tell the subordinate levels when to seek further guidance from the NCL. If a commander finds itself unable to adjust to emergent circumstances, a wake-up rule is triggered to re-initiate the NCL assessment/decision cycle. (Bennett and Davis, 1984, p. 5)

The designers of RSAS see three major applications for their creation:

- fully automated analytic tool;
- man-machine war game, where human players oppose one or more computerized agents; and
- scenario generation/ajudication tool to support conventionally structured games. (Shlapak, 1985, p. 1)

As a simulation, RSAS gives an analyst the ability to manipulate a wide variety of political-military variables and examine their effect. It is also fast, running a 30 day war on Europe's central front in approximately one hour (Davis, 1985, p. 20). Such speed enables a wide range of issues to be examined in a shorter amount of time.

Used as a game, RSAS allows human players to replace any agent, at any decisionmaking level. When human teams are not available (Red teams are especially difficult to put together, since good experts on the USSR are relatively scarce) the agents themselves can be used as opponents (Masterson and Tritten, 1987, p. 118). Besides selecting among Ivans and Sams, the player/analyst may also select from a variety of temperaments for each third country represented in Green Agent, ranging from staunchly pro-Blue to neutral to staunchly pro-Red (Shlapak and others, 1986, p. vi). To facilitate human interaction, Rand has developed a relatively friendly language known as RAND-ABEL for use with the RSAS (Bennett and Davis, 1984, p. 5).

3. Global War Games

(1) LEVEL OF PLAY: Multiple; national command authority to theater command levels.
(2) STRUCTURE OF PLAY: Multiple; both rigid and free.
(3) LEVEL OF SIMULATION: Multiple; both manual and man-machine systems used.
(4) NUMBER OF SIDES: Many.
(5) INFORMATION LIMITS: Mostly closed, although some open play may occur.
(6) PURPOSE: Planning, Discovery.

The final example of gaming applications is the global war game: a highly aggregated strategic-level game that combines many game systems. Most global games include hundreds of players and analysts, experts from diverse organizations and institutions: naval and military officers (including many flag officers), legislators, policy-makers

and staffers from many government agencies and departments, businessmen, civilian strategists, and many more (Hay, 1987a, p. 8; Browning, 1984, p. 109). And while a host of strategic and operational issues are scrutinized, major emphasis is also placed on examining the relationship between war and politics. "The political-diplomatic interaction," remarks one global game participant, "played a more significant role than I envisioned, and gave me a greater insight into the impact of such considerations on military theater operations." (Browning, 1984, p. 111)

Prominent examples of global gaming are found at two service colleges: the National Defense University in Washington D.C., home of the Proud Prophet games; and the Naval War College in Newport R.I., where the decade-old Global War Game series is conducted. Because of their size and structure, global games played at these and other locations can effectively examine a diversity of strategic issues. These include:

- strategic concepts for joint and combined campaigns;
- theater priorities in global conflict situations;
- the impact of different strategies on opponent decisionmaking;
- the role of diplomacy as part of national strategy;
- mobilization, public safety, and war economics/finance issues;
- the impact of domestic politics, public opinion, and the media on conduct of a protracted war;
- logistical problems associated with protracted global war;
- escalation, de-escalation, and war termination concepts; and
- the impact of advanced technology on war-fighting. (United States Naval War College, 1987, pp. 3-4)

Global games usually integrate a number of different game structures. On the national policy level, play is conducted in the form of political-military seminars, while in the theater commands ("at the front," so to speak), the game is played with support from computerized air, ground and/or naval combat models, as appropriate. In effect, a global game consists of myriad mini-games, each examining some facet of political activity or military operations within the overarching context of a simulated global conflict.* And while the mini-games cover specific topics in detail, they also feed back to the main scenario, thus providing a richness and complexity unavailable through other types of games: "The global war game is the only setting in which all of the factors that impact on strategies are looked at simultaneously and realistically." (Connors, 1984, p. 108)

---

*Typical mini-games may address alliance relations, international economics, conventional military and naval activity (by theater), global logistics, space as a theater of war, nuclear and chemical warfare, domestic politics, communications/negotiations between belligerents, and many other topics (Hay, 1987a, p. 2).

IV. THE LIMITATIONS OF GAMING

No methodology is perfect, and gaming is no exception. The strategist must be wary of the potential distortions and artificialities present in gaming, the exact nature of which may vary in accordance with differing game objectives. Where discovery games may be badly inhibited by excessive model structure, this same structure may be desirable, or even essential, for a planning game. Most educational games require carefully contrived and controlled scenarios to focus student learning, while other types of games eschew these deterministic scenarios. Some games demand high quality Red play, but in other games such play is less important.

War game users must contend with distortions from analysis and analytic models: the limits of the Black Box. They also face limits beyond the Black Box: artificialities imposed by scenarios and human nature. But the problems and limitations of war games, both from within and without the Black Box, are not insurmountable. Most of them are minimized through proper validation procedures.

A. THE INNER LIMITS OF GAMES: PROBLEMS WITHIN THE BLACK BOX

For all the benefits of automation, the Black Box is truly a Pandora's Box for the strategist. If automated gaming systems are fast, portable, and capable, they are likewise

expensive to build and maintain. Computer models often require much time and effort to develop, and if not "user friendly," they also consume considerable man-hours to learn how to run.

While computerized games allow for more precise control over variables, they are not omniscient. A computer-defined universe, even at best, is a finite universe, never able to fully simulate the real world faced by policy-makers. "If good models are available," an experienced gamer remarks "one wonders why the game play is needed at all." (Thompson, 1983, p. 86)

Even the best models are not perfect representations of reality, and game play is required to flesh out qualitative issues that models cannot address. Nevertheless, mathematical models (particularly computer models) are useful, perhaps indispensable tools for many modern war games. The strategist, as the analyst, should be familiar with the strengths and weaknesses of models; he must understand how models, both good and bad, may exert undesirable influences on war games.

1. Bad Models: A Question of Worth

Since quantitative models are frequently needed to represent actual physical and human processes within the contrived environment of gaming, the accuracy with which reality is depicted depends significantly on the authenticity of a game's models. Poor models are usually deficient in the

quality of their data bases and/or the verity of their simulation processes. As Brewer notes:

> ...most defense studies [including war games] that rely heavily on mathematical and statistical techniques are vulnerable on at least two counts: (1) Data inputs have obscure, unknown, or unknowable empirical foundations, and the relevance of much data to the important matters at issue, even if valid, is seldom established. (2) The models, and the behavioral propositions and assumptions on which they are based, are not often reliable or validated. (Brewer, 1984, p. 803)

War games using models that function with inaccurate data and/or implausible simulation mechanisms may lead to game results with little or no meaning, and are potentially dangerous. Since model deficiencies are often difficult to identify, they may lead to delusive game experiences that convey false conclusions. On the policy level, "...misplaced emphasis, unwarranted confidence, and unwise resource allocation..." may result from games in which bad models "...conceal spurious content beneath protective layers of mathematics and statistics." (Brewer, 1984, p. 803)

2. Good Models: The Tyranny of the Computer

As stated earlier, even good models cannot fully capture reality. Gamers, particularly those involved with games of discovery, must be especially wary lest their insights become unnecessarily constrained by presuppositions hidden within the Black Box. "Computer models entail rigid assumptions," comments an experienced game director, "and so the computer may limit free play." (Hay, 1987b)

The "Tyranny of the Computer" tends to suppress the very qualitative, intangible properties that gaming is intended to "liberate." (Hausrath, 1971, p. 268) Heavily automated games, however useful, are particularly susceptible to fixed constraints imposed by their models. Imaginatively used, computer models are powerful tools, facilitating examination of whole new areas of strategic knowledge. But if participants are unintentionally lulled into a routine of "default gaming," the game becomes little more than a computer simulation, and human participation may not be meaningful (Pease, 1987).

B. THE OUTER LIMITS OF GAMES: PROBLEMS BEYOND THE BLACK BOX

Outside the Black Box, games are subject to a variety of elements that may reduce their effectiveness. Considered here are four of them: quality of scenario, human temperament, playing Red, and the authenticity of game decisions.

1. Quality of Scenarios

Good scenarios are as important to gaming as good models. Like bad models, bad scenarios will cause focus to shift from the game itself; players will spend most of their time trying to understand the scenario (or picking it apart), rather than playing. But even well-constructed scenarios have their limitations. As do models, scenarios implicitly limit player options. Because they "...describe the future -- as projected, assumed, speculated or hypothesized..." by their

authors, scenarios "...foreordain the results and conclusions of military planning studies." (Builder, 1983, p. v)

The complex nature of contemporary international affairs demands a variety of broad scenarios. Scenarios narrowly focused on just a few issues are unrealistic and result in strategic myopia. On the other hand, imaginative and comprehensive scenarios will stimulate broad strategic vision:

> ...a complete wargame should not deal only with the armed conflict portion of war. To do so will lead participants to believe that escalation decisions only involve moving up and down the so-called vertical escalation ladder or expanding/limiting armed conflict horizontally beyond or to theaters of origin. A more correct representation of war involving political, economic, moral and similar areas would reveal that escalation also involves economic warfare, world public opinion, actions by allies, and the very crucial variable of time. (Tritten, 1987, p. 5)

Several gaming experts feel that some strategic games feature in weak or deficient scenarios. "The top levels of the U.S. political and military leadership," writes strategic gaming pioneer Lincoln P. Bloomfield, "could...benefit from more sophisticated political simulations of all too common situations of no-war/no-peace, learning how better to manage such crises with a view towards mutual de-escalation." (Bloomfield, 1984, p. 790) Recent suggestions to improve scenario design and validity could, if

properly utilized, provide the types of game context that Bloomfield advocates.*

2. Human Temperament

Human nature plays a central role in gaming, and if it is manifested more explicitly in war games than in other methodologies, it is still problemical. Players, umpires, and sponsors can easily defeat the purpose of a game with ignorance and prejudicial attitudes.

Lack of preparation is a problem in many educational and planning type war games that require players to be cognizant of game issues in advance. Poor preparation is sometimes caused by failure of the gaming facility to provide pertinent information on game requirements, objectives, and scenario before the game begins. It also results from participants' inability or unwillingness to ready themselves for play. Consequently, much time may be lost bringing negligent and ignorant players up to speed at the outset of these kinds of games.

Among more experienced and better prepared gamers, prejudicial attitudes may interfere with game results. If they loose sight of game objectives, players may find

---

*For more information on the design and improvement of scenarios see: Center for Naval Analysis Report CRM-86-50, Wargame Design, Development, and Play, by Peter P. Perla, pp. 9-20, February 1986. Also see: Rand Corporation Report N-1855-DNA, Toward A Calculus of Scenarios, by Carl H. Builder, January 1983.

themselves playing more against Control instead of their designated supposed opponent. Some players go into a game with the notion that "victory" must be achieved at any cost, and end up trying to beat the game's models rather than the enemy team (Masterson and Tritten, 1987, p. 119). While good Control groups can usually overcome these problems, umpires may themselves intentionally or unintentionally bias judgments. And Control may also be forced to contend with misplaced sponsor expectations of what the game should and should not accomplish.

Role-playing sometimes presents a major challenge in games that assign players specific decisionmaking authority. Even the most conscientious participants may express incredulity when faced with unanticipated outcomes: "...the most difficult time for all players and controllers to keep within their roles occurs when assessment results are supported, especially when those results differ from player expectations." (Perla, 1986, p. 29) Furthermore, "Friday afternoon syndrome" is almost inevitable. As a game's deadline approaches, play tends to get sloppy; participants become more concerned about catching flights home than in playing out roles to the bitter end.

3. Playing Red

During the 1960s, it was commonplace for both sides in a war game to play out doctrines, strategies, values and outlooks that were essentially "Blue" in character. (McHugh,

1966, p. 1-30) This situation is now changing. Many American strategists have recently awakened to the notion that Soviet thinking on matters of war, politics, and strategy are not a simple mirror image of their own:

> Soviet strategic policy cannot be likened to a loose gun carriage on a rolling deck (indeed, that simile more nearly approximates the enduring U.S. policy condition); it is not eccentric, irrational...or even particularly mysterious in its driving motivations and its goals. However, it is different from US. policy; it cannot be approached in familiar American terms. (Gray, 1986, p. 65)

That the gaming community shares in the growing appreciation of the Soviet Union's unique strategic culture is demonstrated by the proliferation of special groups of experts versed in Soviet military history and practices, educated and trained to "think Red." These professional Red players, like the Naval Operational Intelligence Center cell at the U.S. Naval War College, the Army's Red Team, and the Air Force's Checkmate Unit, bring a certain Soviet-like expertise to war gaming.

Despite recent improvements, Red play is still considered by many to be a major stumbling block. If expert Red players are gaining pre-eminence, some games still field poorly prepared personnel that "...just shift sides from Blue to Red." (Allen, 1987, p. 39) Even among the more sophisticated Red teams, deficiencies exist in non-military play due to a lack of participants with sufficient knowledge in Soviet politics, economics, and society outside the narrow military sphere (Hoffman, 1984, p. 818). Experiments with

Soviet immigrants have produced opposite results. Despite their intimate familiarity with Russian culture, few immigrants are adequately informed on Soviet national security decisionmaking to be of use in strategic games.

In pursuit of better Red play, the gaming community is following several approaches. Automated systems such as RSAS (when applied with care and full knowledge of their limitations), offer one solution. By combining expert knowledge with artificial intelligence, such systems produce a ready-made "Red Team" of sufficient quality to offer meaningful game play. Another answer is found in the design of scenarios. Some experts advocate building a few scenarios "bottom up from Red's perspective," because too many games place Red players in situations totally unreasonable from the Soviet point of view (Giesler and Sloan, 1987). Many new insights would certainly be gained by playing Blue (as well as Red) in such a Red context.

4. Game Decisions and Reality

Enthusiasts may acclaim gaming for its realism (especially when compared to other methodologies), but game reality is deceptive:

> ...people do not die, and the balance of world power does not hinge upon the game's outcome. Since not as much is riding on the decisions, players might be more aggressive, flamboyant, or in some cases, overly cautious, than they would be in the real world. Thus, while the decision process looks reasonably genuine, the decisions may not ring true. (Thompson, 1984, p. 85)

Although they approximate certain aspects of decisionmaking quite well, games cannot capture every influence acting on the real-life decisionmaker. Courage, fatigue, charisma and other intangibles often defy even qualitative treatment.* The impact of routine distractions, such as meetings, reports, and administrative tasks are normally minimized. Finally, games are incapable of simulating the awful burden of responsibility shouldered by real policy-makers and military officers in actual conflict situations: "the lack of real pressure on players is a major game distortion. People simply will act differently when actually being fired upon." (Hoffman, 1984, p. 819) After all, how does one simulate the unthinkable?

D. WAR GAME VALIDATION

A war game's validity is defined as "...the extent to which its processes and results represent real problems and issues opposed to artificial ones generated by the gaming environment." (Perla, 1985a, p. 19) In most planning and discovery applications, validation is the key to effective utilization of war games.** If he is to apply game-derived

---

*Some of these characteristics are better addressed by field exercises and maneuvers using actual forces. In addition, it is possible to model the some of the effects of these traits by altering parameters (force effectiveness, for example), within the war game.

**Validation is less important for educational or advocacy purposes, where the instructor/controller

knowledge to real problems, the strategist must be satisfied that the game's decisions and events are plausible: that they are reasonable facsimiles of reality. To sort out game-induced distortions and misrepresentations from genuine issues and insights, the strategist must employ procedures of validation.

Many games, including strategic games, apparently suffer from lack of validation. In their 1979 study, Brewer and Shubik criticized both the poor quality of most game evaluations and the resistance of the professional gaming community to any improvements (Brewer and Shubik, 1979, p. 73, 186-187, 252-253). Five years later the situation seemed little improved, as Brewer again chided war gamers for the "...undeveloped state of validation," and "neglect of...sensitivity analysis and scrutiny of work for its relevance to realistic conditions." (Brewer, 1984, p. 809) While the validity of a game's models may be established through stringent scientific testing, the same cannot be said of the game as a whole. Since most game outcomes are subjective and not readily measurable, they do not lend themselves well to rigorous validation procedures. Instead, the validity of war games is "more a matter of judgment than precise measurement." (Hausrath, 1971, p. 287)

---

deliberately contrives and manipulates game mechanics and scenarios to facilitate learning.

Many people consider a war game's validity to be self-evident, a matter of simple common sense. As war game scholar Robert Mandel points out:

> ...most users of professional level war games do not subject these exercises [war games] to systemic validation efforts because these officials assume, with a kind of "practice-makes-perfect" mentality, that these exercises are inherently valid. (Mandel, 1985, p. 494)

While common sense is an entirely appropriate validation device for war games, it must be applied as part of a structured, methodical validation plan. Such a plan could evaluate the game in terms of each of its components:

(1) Validity of Mechanics
- Are the assumptions and theories underlying models explicit? Are they credible?
- Are models faithful to their underlying theory and assumptions?
- Are model systems and results consistent with the actual physical and human processes that they approximate?

(2) Validity of Scenario
- Is the scenario plausible? Does it account for differences in strategic culture between opponents?
- How do the scenario's assumptions influence player decisionmaking? Does it allow genuine decisionmaking flexibility, or does it render the game a foregone conclusion?

(3) Validity of Participant Decisions
- Are opposing sides played with cultural realism or are they mirror images of each other?
- How does player knowledge and attitude color game decisions? Are players sincerely playing out their roles?
- How well do player decisions reflect the gravity of the game's simulated conflict situation? Do the players take risks similar to those expected in real-life?

Game reports and documentation should include sufficient information to permit post-game researchers to establish

validity using questions like those above. The specific questions posed by a given validation plan would of course vary according to different types of war games, and different game objectives. But the basic purpose of validation will not vary: to identify and assess the impact of game artificialities on player decisions and game events.

V. CONCLUSIONS

The resurgence of war gaming interest manifested by the contemporary American defense community is, for the most part, well-placed and well-founded. Despite their limitations, strategic/political-military games (as well as their operational and tactical counterparts) can produce unique and illuminating perspectives on many complex security issues. Such games offer a multi-dimensional medium for strategic education, planning and discovery, largely because of their ability to capture and convey qualities beyond the reach of conventional analytic techniques.

While recognizing the substantial potential of war games, caution must nevertheless be exercised in their application. Too much faith in any single methodology, including gaming, is often a mistake. The strategist should remember that games simply cannot address every aspect of the problems he may confront.

A. THE WAR GAME: A DOUBLE-EDGED SWORD

"In general," comments Robert Mandel, "war games appear most necessary when other approaches to military analysis are costly, risky, ethically controversial, or simply unavailable." (Mandel, 1985, p. 485) If rigor and replication are needed, as in the study of phenomena subject

mainly to the physical paradigm, treatment with analytical methods is probably more in order. This is because the "human" factor so important to games also renders them virtually impossible to fully control variables and reproduce results with precision. First, busy schedules make it difficult to gather the exact same players for repeat games. Second, as a person gains experience in a game, his judgment and decisionmaking is inevitably influenced by familiarity with game context and mechanics, as well as by knowledge of previous game outcomes. Thus, even if the same people are available to participate in multiple iterations of a game, the analyst can never be sure how much their decisions are effected by learning derived from earlier play. Even the best validation techniques cannot begin to separate "game wise" decisions from authentic ones under such circumstances.

If, on the other hand, the topics under consideration are related more to the historical paradigm, the methodology of gaming is entirely appropriate. Precision and replicability are not necessarily prerequisites for meaningful examination of many qualitative strategic issues, and it is to the study of these hard-to-measure attributes that war games should be utilized.

Having determined the applicability of the war game to the issues at hand, the strategist must design and conduct his gaming with care. Human nature being what it is, the artificialities of gaming are sometimes easy to overlook,

especially in a well-developed game with highly believable scenarios and mechanics: "War games attempt to create the illusion of reality and where this has been done successfully, the game can be a powerful and sometimes insidious influence, especially on those who have limited operational experience." (Perla, 1985b, p. 77). Thus the war game is double-edged sword. Where it can impart a sense of strategic reality to otherwise recondite ideas, it can also, if used carelessly, create an aura of strategic illusion.

In a study entitled Unintended Consequences of Strategic Gaming, Paul Bracken identifies three undesirable results fostered by games and simulations, or rather their misapplication: unintended learning, diverted attention, and suppressed possibilities (Bracken, 1977, pp. 312-315). These represent some of the more deleterious effects of the gaming sword.

Many war games are intended to serve the purposes of education or advocacy: they are designed to teach specific lessons to participants. Extra caution must be exercised by the designers and users of such games, lest they backfire and foster unintended and undesired learning. Games are powerful tools, and the wrong lessons and wrong conclusions can make just as strong an impression as the "right" ones.

A war game that "proves" or "disproves" the efficacy of a plan or strategy should be regarded with extreme skepticism,

as it may deceive the strategist by diverting his attention from other important issues. Since it cannot address every determinant of strategy, a single game (or even a series of games) cannot be taken as the final word on a given matter. The strategist must realize that the war game is not a "test" in the sense of an absolute standard meant to be passed or failed. Instead it is a way to examine the qualities of an idea or strategy. War games do not prove anything, but they do suggest how an idea might play out in a dynamic real-world setting. Gaming should engender questions and hypotheses, not answers and proofs. Rather than divert attention away from seemingly "resolved" issues, proper understanding and application of gaming methodology will raise issues to be evaluated by other means.

Game-induced distortions may result in the inadvertent suppression of certain future possibilities and outcomes. For this reason, the strategist should not use gaming as a methodology for prediction. War games are simply too vulnerable to subjective inauthenticities to be effective forecasting devices. Indeed, many types of political-military games intentionally incorporate unpredictability into their designs so as to better approximate actual human conditions. Excessive belief in game results is usually a recipe for self-deception and unrealistic policy: the strategist "...cannot blithely treat the game experiences as if they were the same as

corresponding experiences in the real world." (Thompson, 1983, pp. 87) Gaming is best employed as a means to build and explore alternative scenarios of the future, not as a crystal ball.

B. UNLOCKING THE POTENTIAL OF WAR GAMING

Historically oriented and political-militarily educated strategists must more fully investigate the theory, applications, and epistemology of war games if they are to unlock the best potential of gaming methodology. The objective of their research is a better understanding of the impact of game artificialities, and how to compensate for them with proper validation procedures.

Some experts suggest that various elements of analytical theory are relevant to games: organizational theory, small group theory, communications theory, and decision theory, to name a few (deLeon, 1981, p. 214). But war game theory, as distinct from that of analyses, is "...primarily a coherent body of wisdom, characterized by judgment rather than analysis - in the narrowest sense of that term." (Brewer and Shubik, 1979, p. 72) The contribution of analysis, and analytic theory, to gaming is unequivocal, but it is just as important, and perhaps more illuminating, to subject the war game to historical study and historical theorizing. The historical paradigm is built on human judgment, as is the war

game, so the wise strategist will rely on history, as well as analysis, for developing his theories of war gaming.

Problems of war game application are best addressed with a skeptical, questioning attitude. The strategist should never be satisfied with claims of a game's validity. If play does not tax models, if scenarios seem flawless, if the game runs too well, there is a good chance that something has been missed; too much has been simplified or assumed away. Just as players should learn something from a game, so should controllers, and designers. If such is not the case, a breakdown of the "Gaming Loop" has occurred, and the smart strategist should regard the game with suspicion, while attempting to resurrect the games development process.

This thesis has already touched upon problems of applied gaming currently receiving attention from strategists: the importance of Control, improvements in Red play, the need for better scenarios, etc. But nowhere today is political-military gaming at more significant watershed than in the use of automation.

Automated models are becoming more practical, flexible, and transparent, and more widely used in war games. Although they are not a cure-all, careful application of state-of-the-art computer technologies does hold promise for many types of strategic games. Computerized games, if conducted properly, enable the strategist to examine more issues in less time and with more (but not too much)

precision than completely manual methods. Fast, sophisticated systems like the RSAS are capable of performing as players and/or as Control in large-scale, aggregated game situations that might normally take man-years of effort to conduct with strictly human play. An especially fertile application may emerge when such automated systems are wedded to other types of games. For example, the RSAS would likely perform well as a scenario generator or an adjudication device for a global war game.

With the surge of potentially useful information emanating from both computerized and manual war games, methods to extract game knowledge must be formulated. In effect, the strategic community must construct an epistemology of gaming.

"No one" concluded Brewer and Shubik in 1979, "is certain about what game players, builders, and users, are actually getting out of play, construction or use of these devices." (Brewer and Shubik, 1979, p. 73) This statement apparently still holds true eight years later, in light of the relative dearth of studies that deal with information from war games.*

---

*Several notable studies using war game information do exist. These include: Brown, T.A. and Paxson, E.W. A Retrospective Look at Some Strategy and Force Evaluation Games, Rand Corporation Report P-1619-PR, September 1975.; Mandel, Robert, "Political Gaming and Foreign Policy Making During Crises," World Politics, v. 29 pp. 610-625, July 1977.; and Vlahos, Michael, The Blue Sword: The Naval War College and the American Mission, 1919-1941, Naval War College Press, 1980.

It seem that much work remains to be done to build a body of knowledge derived from gaming.

To encourage proper examination and interpretation of war game knowledge, every game should incorporate complete documentation and a formal analysis plan. Larger games and game facilities may benefit even further by instituting a research organization like the Analysis Group found at the Naval War College's Global War Game, devoted entirely to the study of war game information. Participants can assist in the work of these groups by keeping "battle diaries": notes made during actual game play of their observations, thoughts, reasoning, and decisions (Perla, 1986, p. 30). And personnel charged with documenting game results would do well to adopt a report format that would facilitate later research.*

Because of the war game's correspondence to the historical paradigm, a war game report "should more closely resemble an historical treatise than the the documentation of a campaign analysis." (Perla, 1985a, p. 20) Like good analytical history, it will examine causal factors and motivations as well as simple event sequences. As a minimum, game documentation should include:

---

* New opportunities for in-depth research of war games are offered by automated systems like the RSAS. These systems are capable of keeping detailed records of game decisions and decision rationale to supplement the documented impressions of human players and observers.

- a statement of game objectives, and an outline of how the game's design satisfies those objectives;
- a description of the game scenario, making underlying assumptions as explicit as possible;
- a brief description of the game's models, emphasizing their use and possible impacts on play, and explaining their basic assumptions;
- a general chronology of game events;
- discussion and historical-type analysis of causation and motivation behind game events;
- investigation of seemingly unusual, chance, or contingency events, and how they affected game play;
- lessons learned; not "proofs" of theories and hypotheses, but rather issues, broader insights, and generalizations raised or suggested by the study of game events and decisions; and
- topics and possible hypothesis to be researched further or examined in future games.

With the availability of comprehensive, well-documented information from war games, a number of new possibilities emerge for strategic studies:

(1) In-depth examination of a given series of games, specifically to identify and assess salient patterns and ideas.
(2) Research to compare and contrast past games to actual historical events. The underlying reasons for divergences and similarities between real and fictitious events may provide greater insight into the actual behavior of international actors.
(3) Comparative studies of different types of war games dealing with similar issues. For example, the strategist may want to compare the results of an RSAS game with those of a seminar game. Besides surfacing important new issues, such studies enhance the validity of both kinds of games.

These are just a few of the sorts of studies made possible by gaming (if documentation is properly prepared), and the imaginative strategist will undoubtedly conceive of additional research designs.

Gaming methodology is a unique and important tool for the strategist/historian. Because of "..its ability to help us

understand better the roles, capabilities, and limitations of that most ubiquitous warfighting system, the human being," the war game "is a powerful and effective learning device." (Perla, 1985a, p. 18) Games are used within the defense community to educate and advocate, to plan and to organize thinking, and to help develop new ideas and insights. They offer a means to train present and future planners, negotiators, and policy-makers to grasp the dynamics of international relations and strategic thought. They also facilitate examination of numerous topics of more immediate strategic interest.

War games give the strategist largely unmatched ability to safely explore a host of momentous questions: what are the relationships between protracted conventional war and nuclear war? How can conventional operations impact the strategic nuclear balance? What types of command, control, and communications limitations might the NCA face in operating strategic forces after a massive nuclear attack? How can the superpowers safely transition to security postures based on strategic defenses? What are the merits of a maritime strategy versus a continental strategy in various parts of the world? What sorts of competitive strategies seem most promising for future development? How might military, political, economic, and social forces be employed to achieve national goals in crisis situations short of war? What kinds of long-term strategies and policies seem

appropriate for dealing with non-superpower nations and other international actors? What are the political and military implications of different arms control regimes? What are potentially fruitful techniques to employ when negotiating arms control? Collective security agreements? War termination? How might domestic political imperatives be addressed in defense policies? What preparations must be made in peacetime for effective mobilization in the face of crisis or conflict?

The list of issues is seemingly endless, and gaming is a methodology well-suited to explore many of them.

It is imperative that the strategist become involved with the new gaming techniques being introduced today, and he must lead the way in development of a war game epistemology to unlock the potential of these new techniques. By projecting his history-based perspective into gaming methodology, the strategist can augment the analyst by exerting a realistic, balancing influence on defense decisionmaking. Gaming, like all efforts to improve defense policy-making, is not a panacea, but it may help responsible officials reduce uncertainties and hopefully introduce better decisions into an already complex process. In this way, national security policy may move beyond bean counts and black boxes into the realm of true strategy.

APPENDIX

GLOSSARY

ANALYSIS: A set of empirical approaches to policy study. These include Cost Effectiveness Analysis, Cost Benefit Analysis, Systems Analysis, Operations Research, Campaign Analysis, and others (Quade, 1975, pp. 1-30). A branch of analysis often confused with gaming is "game theory", which is actually a body of mathematical theory that examines human decisionmaking in situations of conflict and cooperation.

ANALYST: A person who applies analytical methods in policy studies. Analysts frequently rely on mathematical models to approximate selected elements of an idealized conflict. Their vocabulary includes terms like data bases, force ratios, attrition rates, subroutines, and algoritims. (Davis, 1985, p. 4)

EXERCISE: A game that simulates political or military conflict using actual forces.

GAME: A competitive or conflict situation in which opposing human players influence events with their own decisions.

MODEL: The representation of an object or structure; an explanation or description of events, situations, processes or entities; the rules and procedures needed for control and conduct of a war game (Hausrath, 1971, p. 315).

POLITICAL-MILITARY GAME: See STRATEGIC GAME.

SIMULATION: The dynamic representation of events, situations, processes or entities by other systems or models designed to have relevant similarity to the original (Brewer and Shubik, 1979, p. 9).

STRATEGIC GAME: A war game that examines a full range of political, military, economic, and social issues with regard to a nation's overall security policy (Brewer and Shubik, 1979, p. 377). Also known as a POLITICAL-MILITARY GAME.

STRATEGIST: One who studies and develops strategy, usually from a non-technical or historical perspective. Most Strategists are concerned with both grand and operational components of strategy (see STRATEGY), and think in terms of maneuver, initiative, surpise, quality of leadership, force cohesion, mobilization, and national strengths, weaknesses and goals. (Davis, 1985, p. 4)

STRATEGY: Strategy actually consists of two components: Grand Strategy and Operational Strategy. Grand strategy deals with broad issues of war and peace. It attempts to

exploit, direct and coordinate national and/or alliance resources to achieve policy objectives formulated by the national/alliance leadership. Operational strategy, on the other hand, is more exclusively concerned with the efficient and proper direction of military forces to achieve national policy goals. (Liddell Hart, 1967, pp. 335-336)

WAR GAME: A game that simulates political or military conflict without operating real forces.

LIST OF REFERENCES

Allen Thomas B., War Games, Annapolis, U.S. Naval Institute Press, 1987.

Bennett, Bruce W. and Davis, Paul K., The Role of Automated War Gaming in Strategic Analysis, Rand Corporation Report P-7053, December 1984.

Berg, Richard H., "Game Design and Development: A Case Study," in Wargame Design, pp. 30-44, edited by The Staff of Strategy and Tactics Magazine, Hippocrene Books, 1983.

Bloomfield, Lincoln P., "Reflections on Gaming," Orbis, v. 27, pp. 783-790, Winter 1984.

Bloomfield, Lincoln P. and Whaley, Barton, "The Political-Military Exercise: A Progress Report," Orbis, v. 8, pp. 854-870, Winter 1965.

Bracken, Paul, "Deterrence, Gaming, and Game Theory," Orbis, v. 27, pp. 790-802, Winter 1984.

Bracken, Paul, "Unintended Consequences of Strategic Gaming," Simulation and Games, v. 8, pp. 283-318, September 1977.

Brewer, Garry D., "Child of Neglect: Crisis Gaming for Politics and War," Orbis, v. 27, pp. 803-812, Winter 1984.

Brewer, Garry D. and Shubik, Martin, The War Game: A Critique of Military Problem Solving, Harvard University Press, 1979.

Brown, T.A. and Paxson, E.W., A Retrospective Look at Some Strategy and Force Evaluation Games, Rand Corporation Report P-1619-PR, September 1975.

Browning, James W., "Rehearsing the Critical Decisions," U.S Naval Institute Proceedings, v. 110, pp. 109-111, February 1984.

Builder, Carl H., Toward a Calculus of Scenarios, Rand Corporation Report N-1855-DNA, January 1983.

Connors, Tracy D., "Gaming for the World," U.S. Naval Institute Proceedings, v. 110, pp. 106-108, January 1984.

Davis, Paul K., Game-structured Analysis as a Framework for Defense Planning, Rand Corporation Report P-7051, January 1985.

Davis, Paul K., Stan, Peter J.E., and Bennett, Bruce W., Automated War Gaming as a Technique for Exploring Strategic Command And Control Issues, Rand Corporation Report N-2044-NA, November 1983.

Davis, Paul K., Bankes, Steven C. and Kahan, James P., Methodology for Modeling Command Level Decisionmaking in War Games and Simulations, Rand Corporation Report R-3290-NA, July 1986.

deLeon, Peter, "The Analytic Requirements for Free Form Gaming," Simulation and Games, v. 12, pp. 201-231, June 1981.

Dupuy, R. Ernest and Dupuy, Trevor N., The Encyclopedia of Military History from 3500 B.C. to the Present, 2nd. ed., Harper and Row, 1977.

Durnan, Jamyie, LCDR., USN, Office of the Secretary of Defense/Net Assessment, Interview, Washington, D.C., 8 October 1987.

Euliss, James P., "Wargaming at the U.S. Naval War College." Naval Forces, v. VI/5, pp. 96-106, 1985.

Giesler, Fred and Sloan, John, Science Applications Incorporated, Interview, McLean, Va., 15 October 1987.

Goldhamer, Herbert, and Speier, Hans, "Some Observations on Political Gaming," World Politics, v. 12, pp. 71-83, October, 1959.

Gray, Colin S., Nuclear Strategy and National Style, Hamilton Press, 1986.

Guetzkow, Harold, and others, Simulation in International Relations: Developments for Research and Teaching, Prentice-Hall, 1963.

Hausworth, Alfred H., Venture Simulation in War, Business, and Politics, McGraw-Hill, 1971.

Hay, O.E., The Global War Game Series, paper presented to the 55th MORS Symposium, May 1987a.

Hay, O.E., U.S. Naval War College, Interview, Newport, R.I., 30 July 1987b.

Hoffman, Lloyd D., "Defense War Gaming," Orbis, v. 27, pp. 812-822, Winter 1984.

Jones, William M., On the Adapting of Political-Military Games for Various Purposes, Rand Corporation Report N-2413-AF/A, March 1986.

Kaplan, Fred, The Wizards of Armageddon, Simon & Schuster, 1983.

Kappper, Francis P., "Wargaming and Crisis Management," Defense 81, pp.13-26, May 1981.

Lawrence, Richard D., "Playing the Game: The Role of War Games and Simulations," Defense 86, pp. 22-27, January-February 1986.

Liddell Hart, B.H., Strategy, 3rd. ed., Frederick A. Praeger, 1967.

Mandel, Robert, "Political Gaming and Foreign Policy Making During Crises," World Politics, v. 29, pp. 610-625, July 1977.

Mandel, Robert, "Professional Level Wargaming: An Assessment," in Theories, Models, and Simulations in International Relations: Essays in Honor of Harold Guetzkow, pp. 483-500, edited by Michael Don Ward, Westview Press, 1985.

McHugh, Francis J., Fundamentals of Wargaming, 3rd ed., U.S. Naval War College, 1966.

Mann, Paul, "Thinking Strategically," Aviation Week and Space Technology, p. 13, 6 July 1987.

Marshall, A. W., "A Program to Improve Analytic Methods Related to Strategic Forces," Policy Sciences, v. 15/1, pp. 47-50, November 1982.

Martin, J.J. and Olin, Douglas C., "Improved Methods for Strategic Analysis," Policy Sciences, v. 15/1, pp. 51-69, November 1982.

Masterson, Kleber S., Jr. and Tritten, James John, " New Concepts in Global Wargaming," U.S. Naval Institute Proceedings, v. 113, pp. 117-119, July 1987.

Pease, Charles C., Capt., USN (Ret.), United Technologies Corporation, Interview, Washington, D.C., 14 October 1987.

Perla, Peter P., Wargame Design, Development, and Play, Center for Naval Analysis Report CRM-86-50, February 1986.

Perla, Peter P. and Branting, Darryl P., Wargames, Exercises and Analysis, Center for Naval Analysis Report CRM-86-20, February 1986.

Perla, Peter P, and Barrett, Raymond T., An Introduction to Wargaming and its Uses, Center for Naval Analysis Report CRM-85-91, October 1985a.

Perla, Peter P, and Barrett, Raymond T., "What Wargaming Is and Is Not," Naval War College Review, v. XXXVIII, pp. 70-78, September-October 1985b.

Quade, E.S., Analysis for Public Decisions, Elsevier, 1975.

Shafer, Robert Jones, ed., A Guide to the Historical Method, 3rd. ed., Dorsey Press, 1980.

Shlapak, David A., Rand Corporation, Interview, Washington, D.C., 14 October 1987.

Shlapak, David A., The Rand Strategy Assessment Center and the Future of Simulations and Gaming, Rand Corporation Report P-7162, November 1985.

Shlapak, David A., and others, The Rand Strategy Assessment System's Green Agent Model of Third Country Behavior in Superpower Crisis and Conflict, Rand Corporation Report N-2363-1-NA, September 1986.

Sims, James M., Politico-Military Gaming: A Method for Developing Strategy and Security Policy, paper presented at the Fourth Republic of Korea-United States Analysis Seminar, Seoul, Korea, 28 September 1987.

Sterne, Theodore E., "Wargames: Validity and Interpretation," Army, v. 16, pp. 64-68, April 1966.

Thompson, Frederick D., "Beyond the Wargame Mystique," U.S. Naval Institute Proceedings, v. 109, pp. 82-87, October 1983.

Tritten, James John, Creative Use of Scenarios, Naval Postgraduate School Report NPS-56-87-001, April 1987.

U.S. Naval War College, War Gaming Department Book: Global War Game 1987, U.S. Naval War College, July 1987.

Visco, E.P., Contingency Gaming at the Joint Chiefs of Staff: How it Effects National Security Policy Making, Research Report, National War College, February 1987.

BIBLIOGRAPHY

Barringer, Richard E. and Whaley, Barton, "The M.I.T. Political-Military Gaming Experience," Orbis, v. 8, pp. 437-458, Summer 1965.

Bennett, Bruce W., Rand Corporation, Interview, Washington, D.C., 14 October, 1987.

Browne, Malcom W., "Computers Give a New Impetus to `War' Games," The New York Times, v. CXXIX, p. A1, 20 April 1978.

Bloomfield, Lincoln P., "Political Gaming." U.S. Naval Institute Proceedings, v. 86, pp. 57-64, September 1967.

Bloomfield, Lincoln P. and Gearin, Cornelius J., "Games Foreign Policy Experts Play: The Political Exercise Comes of Age," Orbis, v. 16, pp. 1008-1031, Winter 1973.

Bloomfield, Lincoln P. and Padelford, Norman J., "Teaching Note: Three Experiments in Political Gaming," The American Political Science Review, v. 53, pp. 1105-1115, December 1959.

Cushman, John H., Lt. Gen., USA (Ret.), Interview, McLean, Va., 15 October 1987.

Daniels, Donald, U.S. Naval War College, Interview, Monterey, Ca., 13 August 1987.

Davis, Morton C., Game Theory: A Nontechnical Introduction, 2nd. ed., Basic Books, 1973.

Davis, Paul K., Applying Artificial Intelligence Techniques to Strategic-Level Gaming and Simulation, Rand Corporation Report P-7120, July 1986.

Davis, Paul K., Rand Corporation, Interview, Santa Monica, Ca., 20 August 1987.

Dupuy, T.N., "Can We Rely Upon Computer Combat Simulations?," Armed Forces Journal International, v. 125, pp. 58-63, August 1987.

Dupuy, T.N., Numbers, Predictions and War: Using History to Evaluate Combat Factors and Predict the Outcome of Battles, Bobbs-Merrill, 1979.

Etzold, Thomas H., Interview, Newport, R.I., 29 July 1987.

Graubard, Morlie H. and Builder, Carl H., "New Methods for Strategic Analysis: Automating the Wargame," Policy Sciences, v. 15/1, pp. 72-84, November 1982.

Halberstam, David, The Best and the Brightest, Random House, 1969.

Hermann, Charles F., "Validation Problems in Games and Simulations With Special Reference to Models of International Politics," Behavioral Science, v. 12, pp. 216-231, May 1967.

Kringen, John A., "Utility of Political Gaming: An Evaluation," Simulation and Games, v. 11, pp. 139-148, June 1982.

Lloyd, James, U.S. Senate (Ret.), Interview, Newport, R.I., 28 July 1987.

McDaniel, R., Capt., USN (Ret.), Interview, Newport, R.I., 28 July, 1987.

McHugh, Francis J., "Gaming at the Naval War College," U.S. Naval Institute Proceedings, v. 90, pp. 48-55, March 1964.

Mandel, Robert, "Policy Making Perspectives on War Simulations," Journal of Conflict Resolution, v. 24, pp. 359-375, June 1980.

Marshall, Andrew W., Office of the Secretary of Defense/Net Assessment, Interview, Monterey, Ca., 12 August 1987.

Marshall, Andrew W., Office of the Secretary of Defense/Net Assessment, Interview, Washington, D.C., 8 October 1987.

Masterson, Kleber S., Jr., Radm., USN (Ret.), Booze-Allen & Hamilton, Interview, Arlington, Va., 16 October 1987.

Might, Robert J., Decision Support For Wargames: With Special Emphasis on Crisis Decision Exercise, Research Report, National War College, May 1987.

Might, Robert J., LT. COL., USAF, National War College, Interview, Washington, D.C., 9 October 1987.

Murray, Robert J., "A War-Fighting Perspective," U.S. Naval Institute Proceedings, v. 109, pp. 66-81, October 1983.

Perla, Peter P., Center for Naval Analysis, Interview, Alexandria, Va., 13 October 1987.

Perla, Peter P., "Wargaming and the U.S. Navy," National Defense, v. LXXI, pp. 49-53, February 1987.

Prados, John, Pentagon Games: Wargames and the American Military, Harper & Row, 1987.

Schelling, Thomas C., The Strategy of Conflict, Harvard University Press, 1963.

Schlenker, Barry R. and Bonoma, Thomas V., "Fun and Games: The Validity of Games for the Study of Conflict," Journal of Conflict Resolution, v. 22, pp. 7-38, March 1978.

Sims, James M., COL., USMC, Organization of the Joint Chiefs of Staff, Interview, 15 October 1987.

Shrigley, Ralph, LT. COL., USA, Organization of the Joint Chiefs of Staff, Interview, 15 October 1987.

Strauch, Ralph E., A Critical Assessment of Quantitative Methodology as a Policy Analysis Tool, Rand Corporation Report P-5282, September 1974.

Sun Tzu, The Art of War, trans. Samuel B. Griffith, Oxford University Press, 1971.

Vlahos, Michael, The Blue Sword: The Naval War College and the American Mission, 1919-1941, Naval War College Press, 1980.

Vlahos, Michael, "Wargaming, an Enforcer of Stategic Realism: 1919-1942," Naval War College Review, v. XXXIX, pp. 7-22, March-April 1986.

Watts, Barry D., Northrop Corporation, Interview, Washington, D.C., 9 October 1987.

Wilson, Andrew., The Bomb and the Computer: Wargaming from Ancient Chinese Mapboard to Atomic Computer, Delacorte Press, 1968.

INITIAL DISTRIBUTION LIST

		No. Copies
1.	Defense Technical Information Center Cameron Station Alexandria, Virginia 22304-6145	2
2.	Library, Code 0142 Naval Postgraduate School Monterey, California 93943-5002	2
3.	Department Chairman, Code 56 Department of National Security Affairs Naval Postgraduate School Monterey, California 93943-5000	50
4.	Director, Net Assessment OSD/NA Room 3A930 Office of the Secretary of Defense Washington, D.C. 20301	1
5.	LCDR J. Durnan, USN OSD/NA Room 3A930 Office of the Secretary of Defense Washington, D.C. 20301	1
6.	COL. B. Hogan/LT. COL. R. J. Might, USAF National Defense University War Gaming and Simulation Center Ft. Lesley J. McNair Washington, D.C. 20319-6000	1
7.	Dr. Donald Daniel Campaign and Strategy Department Naval War College Newport, Rhode Island 02840	1
8.	COL. J.M. Sims, USMC Politico-Military Simulation and Analysis Division OJCS/J-8/Room BC942, The Pentagon Washington, D.C. 20301	1

9. CAPT. Frank La Croix, USN 1
Navy FEF
The RAND Corporation
1700 Main Street
Santa Monica, California 90406-2138

10. LTC O.E. Hay, USMC (Ret.) 1
Global War Game and Advanced Technology Dept.
Naval War College
Newport, R.I. 02840

11. RADM L. W. Smith, USN 1
Director, Tactical Readiness Division (OP-953)
Room 5D566, The Pentagon
Office of the Chief of Naval Operations
Washington, D.C. 20350-2000

12. RADM James F. Dorsey, USN 1
DCNO for Plans, Policy, and Operations (OP-06B)
Room 4E592, The Pentagon
Office of the Chief of Naval Operations
Washington, D.C. 20350

13. RADM Jerome F. Smith, Jr., USN 1
Director, Politico/Military and
Current Plans Division (OP-61)
Room 4E572, The Pentagon
Office of the Chief of Naval Operations
Washington, D.C. 20350

14. CAPT Linton Brooks, USN 1
NSC Staff
OEB 386
17 Pennsylvania Avenue
Washington, D.C. 20506

15. CAPT James Amerault, USN 1
OP-91DB
Room 4A478, The Pentagon
Office of the Chief of Naval Opeations
Washington, D.C. 20350

16. Hon. Dennis Shaw 1
DUSN (P)
Room 4E725, The Pentagon
Office of the Secretary of the Navy
Washington, D.C. 20350

17. Hon. Seth Cropsey 1
DUSN (SR & A)
Room 4E780, The Pentagon
Office of the Secretary of the Navy
Washington, D.C. 20350

18. COL Carl Lowe 1
NDU-SCDC
Ft. Lesley J. McNair
Washington, D.C. 20319-6000

19. COL David J. Andre, USA 1
Special Assistant for Analysis
ODUSD (Planning & Resources)
Room 3A7 & 8
Washington, D.C. 20301-6000

20. Dr. Lawrence Gershwin 1
NIO/SP 2E49
Central Intellegence Agency
Washington, D.C. 20505

21. Gordon F. Negus 1
Executive Director
Defense Intelligence Agency (DIA-ED)
Room 3E268, The Pentagon
Washington, D.C. 20301-6111

22. Willy R. Schlossbach 1
National Security Agency
Fort George C. Meade, MD 20755

23. CAPT Ron St. Martin, USN 1
Special Assistant
OUSD/A
Room 1E462, The Pentagon
Office of the Secretary of Defense
Washington, D.C. 20301

24. Dr. Robert Roll 1
Principal Deputy Director, Program
Analysis & Evaluation
PA & E Room 3E835, The Pentagon
Office of the Secretary of Defense
Washington, D.C. 20301

25. Dr. Herb Fallin 1
STA--Box Route
USCINCPAC Staff
Camp H.M. Smith, Hawaii 96861

Thesis
M65575 Mobley
c.1 Beyond the black box: an assessment of strategic war gaming.

Thesis
M65575 Mobley
c.1 Beyond the black box: an assessment of strategic war gaming.

AMERICAN BINDERY TOPEKA KANSAS

thesM65575
Beyond the black box:
3 2768 000 78510 9
DUDLEY KNOX LIBRARY